

# INTERNATIONAL STANDARD



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

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**Part 2-4: Particular requirements for independently mounted switches**

INTERNATIONAL  
ELECTROTECHNICAL  
COMMISSION

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## INTERNATIONAL ELECTROTECHNICAL COMMISSION

## SWITCHES FOR APPLIANCES –

Part 2-4: Particular requirements for  
independently mounted switches

## FOREWORD

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International Standard IEC 61058-2-4 has been prepared by subcommittee 23J: Switches for appliances, of IEC technical committee 23: Electrical accessories.

This second edition cancels and replaces the first edition published in 1995 and constitutes a technical revision.

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

- a) overall format modified to support the revised structure of the series;
- b) Annexes K and M have been included as an integral part of this document;
- c) Annex L has been included for information purposes only.

The text of this International Standard is based on the following documents:

CDV	Report on voting
23J/433/CDV	23J/441/RVC

Full information on the voting for the approval of this International Standard can be found in the report on voting indicated in the above table.

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

This document is to be used in conjunction with IEC 61058-1:2016.

This document supplements or modifies the corresponding clauses in IEC 61058-1, so as to convert that publication into the IEC standard: *Particular requirements for independently mounted switches*.

When a particular subclause of IEC 61058-1 is not mentioned in this document, that subclause applies as far as reasonable. Where this document states "addition", "modification" or "replacement", the relevant text of IEC 61058-1 is to be adapted accordingly.

In this document:

- 1) the following print types are used:
  - requirements proper: in roman type;
  - *test specifications: in italic type*;
  - explanatory matter: in smaller roman type.
- 2) subclauses, figures or tables which are additional to those in IEC 61058-1 are numbered starting from 101.

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

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

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
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## SWITCHES FOR APPLIANCES –

### Part 2-4: Particular requirements for independently mounted switches

#### 1 Scope

Clause 1 of IEC 61058-1:2016 is applicable, except as follows.

##### ~~1.1 Replacement:~~

*Addition:*

This document applies to independently mounted switches for appliances (mechanical or electronic) actuated by hand, by foot or by other human activity ~~for use with~~, to operate or control electrical appliances and other equipment for household ~~and~~ or similar purposes with a rated voltage not exceeding ~~440~~ 480 V and a rated current not exceeding 63 A.

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

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

##### ~~1.2 Replacement:~~

~~This standard applies to independently mounted switches intended to be used with an appliance or equipment.~~

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

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

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

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

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

~~NOTE 4 Throughout this standard the word "switch" means "independently mounted switch" unless otherwise stated.~~

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

##### ~~1.3 Replacement:~~

~~This standard applies to switches intended to be mounted apart from the appliance (independently mounted switches) other than those within the scope of IEC 669-1.~~

## 2 Normative references

Clause 2 of IEC 61058-1:2016 is applicable except as follows:

### ~~2.1 IEC standards~~

~~Replacement of IEC 669-1:1981 by IEC 669-1:1993.~~

*Addition:*

~~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 60227-5, Polyvinyl chloride insulated cables of rated voltages up to and including 450/750 V – Part 5: Flexible cables (cords)

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

IEC 60669-1:2017, Switches for household and similar fixed-electrical installations – Part 1: General requirements

IEC 61058-1:2016, Switches for appliances – Part 1: General requirements

## 3 Terms and definitions

Clause 3 of IEC 61058-1:2016 is applicable, except as follows.

### 3.3 Terms and definitions relating to the different types of switches

*Additional terms and definitions:*

#### 3.3.101

##### **independently mounted switch**

switch intended to be mounted away from the controlled appliance or equipment ~~and intended to be connected to the fixed wiring on the supply side~~

#### 3.3.102

##### **design A switch**

switch where the cover or coverplate can be removed without displacement of the conductor(s)

~~NOTE – Displacement means movement of the conductor, see IEC 60669-1, subclause 7.1.7.~~

#### 3.3.103

##### **design B switch**

switch where the cover or coverplate cannot be removed without displacement of the conductor(s)

~~NOTE – Displacement means movement of the conductor, see IEC 60669-1, subclause 7.1.7.~~

## 4 General requirements

Clause 4 of IEC 61058-1:2016 is applicable.

## 5 General ~~notes~~ information on tests

Clause 5 of IEC 61058-1:2016 is applicable.

## 6 Rating

Clause 6 of IEC 61058-1:2016 is applicable.

## 7 Classification

Clause 7 of IEC 61058-1:2016 is applicable except as follows.

### 7.5 Degree of protection against solid foreign objects

*Replacement:*

~~7.1.5 According to the degree of protection provided by the switch, when mounted as declared:~~

~~7.1.5.1.1, 7.1.5.1.2 and 7.1.9.1 are not applicable.~~

The degree of protection against solid foreign objects is declared.

With the exception of IP0X and IP1X, all IP ratings are allowed.

### 7.11 According to resistance to ignitability by the glow wire temperature

Subclause 7.11.1 of IEC 61058-1:2016 is not applicable.

### 7.22 According to the type of forced cooling

Subclause 7.22.2 of IEC 61058-1:2016 is not applicable.

*Additional subclauses:*

#### ~~7.4.101~~ According to design

~~7.4.101.1~~ design A switch;

~~7.4.101.2~~ design B switch.

NOTE 1 See definitions 3.3.102 and 3.3.103.

NOTE 2 If a switch has a base which cannot be separated from the cover or cover plate, and requires an intermediate plate which can be removed for redecorating the wall, it is considered to be of design A, provided the intermediate plate meets the requirements specified for covers and cover plates.

#### ~~7.4.102~~ According to outlet facilities

~~7.4.102.1~~ switch with inlet/outlet facilities for rigid cables;

~~7.4.102.2~~ switch with inlet facilities for rigid cables and outlet facilities for flexible cables.

## 8 Marking and documentation

Clause 8 of IEC 61058-1:2016 is applicable, ~~except as follows~~ with the following modifications to Table 3:

~~Addition:~~

**Table 101 – Switch information**

No.		Subclause		
	Switch with unique type reference .....		U.t.	
	Switch with common type reference .....		C.T.	
401	SWITCH DESIGN			
401.1	Type of switch design	7.1.101	De	De
402	OUTLET FACILITIES			
402.1	Type of outlet facilities	7.1.102	De	De

**Table 3 – Switch information and loads placed in groups**

Modification:

No.	Characteristic	Subclause	Means of information	
			Common type reference CT	Unique type reference UT
<b>2</b>	<b>SWITCH ENVIRONMENT/MOUNTING</b>			
2.1	Degree of protection provided for the switch when mounted according to documentation (IP code of IEC 60529) NOTE Additional letters listed in IEC 60529 are not used.	7.5 and 7.6	Marking	Marking
<b>4</b>	<b>ELECTRICAL LOAD/CONNECTION</b>			
4.1	Rated voltage or rated voltage range	6.1	Marking	Marking

Additional rows:

<b>101</b>	<b>SWITCH DESIGN</b>			
101.1	Type of switch design	7.101.1 and 7.101.2	Document-ation	Document-ation
<b>102</b>	<b>OUTLET FACILITIES</b>			
102.1	Type of outlet facilities	7.102	Document-ation	Document-ation

## 9 Protection against electric shock

Clause 9 of IEC 61058-1:2016 is applicable, except as follows.

### 9.1 Addition of the following sentence to a):

The switch shall be fitted with the ~~cable~~ conductor of the smallest or largest nominal cross-sectional area according to Table ~~3~~ 4 whichever is more unfavourable, or with a rigid conduit, a pliable conduit or a flexible conduit.

Addition to ~~b~~ d):

This test finger, with an electrical indicator, is not applied to membranes in inlet openings and is applied to thin-walled knock-outs with a force of only 10 N.

Additional subclause:

**9.101** 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 clearances and creepage distances between live parts and metal parts of the mechanism have at least ~~twice~~ the values specified in 20.2.5 and 20.4.5.

Compliance is checked by inspection, by the test of 15.3 and, if necessary, by measurement.

NOTE Lacquer or enamel is not considered to be insulating material for the purpose of 9.101.

## 10 Provision for earthing

Clause 10 of IEC 61058-1:2016 is applicable ~~except as follows~~.

~~Additional subclause:~~

~~10.101 Switches for class I appliances shall have provision for earthing continuity connection.~~

## 11 Terminals and terminations

Clause 11 of IEC 61058-1:2016 is applicable ~~except as follows~~.

~~Table 3 Additional note:~~

~~NOTE Switches with a rated current of 10 A and less shall have terminals accepting 1,5 mm<sup>2</sup> conductors.~~

~~11.1.1.2.2 Addition to a):~~

~~When testing with rigid conductors the tests are carried out first with rigid stranded conductors and the tests are then repeated with rigid solid conductors if a solid conductor with the same cross-sectional area is specified in IEC 60227-3.~~

~~Additional subclauses:~~

~~11.1.2.101 Terminals classified in 7.2.4 are in general not permitted. Such terminals may however in particular cases be permitted for the load side of the switch (see 11.1.3).~~

~~11.1.3.101 The power supply cable shall be connected only by a method of attachment such that the cable can be replaced without the aid of special purpose tools or by a cable not requiring special preparation. Connection from the switch to the appliance shall normally be performed in a similar way, but may in particular cases (e.g. a particular manufactured connection between the switch and the appliance) be made by a method of attachment such that the cable can only be replaced with the aid of special purpose tools normally available to the manufacturer or his agent.~~

~~A method of attachment such that the cable cannot be replaced without destroying the integrity of the switch shall not be used.~~

## 12 Construction

Clause 12 of IEC 61058-1:2016 is not applicable.

~~Replacement:~~

*Additional subclauses:*

**12.101** Insulating linings, barriers and the like, shall have adequate mechanical strength and shall be secured in a reliable manner.

*Compliance is checked by inspection after the tests of Clause 18.*

**12.102** Switches shall be so constructed as to permit:

- easy introduction and connection of the conductors in the terminals;
- adequate space between the underside of the base and the surface on which the base is mounted or between the sides of the base and the enclosure (cover or box) so that, after installation of the switch, the insulation of the conductors does not come in contact with live parts of different polarity or with moving parts of the mechanism, such as the spindle of a rotary switch;

NOTE This requirement does not imply that the metal parts of the terminals are necessarily protected by insulating barriers or insulating shoulders to avoid contact, due to incorrect installation of the terminal metal parts, with the insulation of the conductor.

- easy fixing of the base to a wall or in a box and correct positioning of the conductors.

~~NOTE~~ For surface-type switches, mounted on a mounting plate, a wiring channel may be needed to comply with this requirement.

In addition, switches classified according to 7.4-101.1 (design A switch) shall permit an easy positioning and removal of the cover or cover plate, without displacing the conductors.

*Compliance is checked by inspection and by an installation test with conductors of the largest cross-sectional area for the relevant terminal size, in Table-3 4.*

**12.103** Covers and cover plates or parts thereof, which are intended to ensure protection against electric shock, shall be held in place at two or more points by effective fixing.

Covers and cover plates or parts thereof may be fixed by means of a single fixing, for example by a screw, provided that they are retained in position by another means (e.g. by a shoulder).

~~NOTE 1~~ It is recommended that the fixings of covers and cover plates or parts thereof be captive. The use of tight fixing washers of cardboard or the like is deemed to be an adequate method for securing screws intended to be captive.

NOTE ~~2~~ Live parts and non-earthed metal parts separated from live parts in such a way that creepage distances and clearances have values specified in Clause 20 are not considered as accessible if the requirements of 12.103 are met.

For switches with a degree of protection IPX0, the fixing of covers or cover plates shall not serve to fix any other part, except the knobs.

When the fixings of covers or cover plates also serve to fix the base, there shall be sufficient means to maintain the base in position after removal of the cover or cover plate.

Decorative covers, cover plates or parts thereof not providing protection against electric shock are not considered as covers or cover plates *within* the meaning of 12.103.

~~12.103.1~~ For covers and cover plates or parts thereof whose fixing is of the screw-type, compliance is checked by inspection and by an installation test.

~~12.103.2~~ For covers and cover plates or parts thereof whose fixing is not dependent on screws and whose removal is obtained by applying a force in a direction approximately perpendicular to the mounting/supporting surface, compliance is checked by applying the test described in 13.3.2 of IEC 60669-1:2017 under the conditions set out in 20.4 to 20.6 of IEC 60669-1:2017.

**12.104** Surface-type switches with degree of protection IPX0 shall be so constructed that, when they are fixed and wired as in normal use, there are no free openings in their enclosures.

*Compliance is checked by inspection and by an installation test with conductors of the cross-sectional area specified in Table ~~3~~ 4.*

NOTE Small gaps between enclosures and conduits or cables, or between enclosures and operating means are ~~neglected~~ disregarded.

**12.105** Knobs of rotary switches shall be securely coupled to the shaft or part operating the mechanism.

*The knob is subjected for 1 min to an axial pull of 100 N.*

*In addition, for knobs of switches having only one direction of operation, a torque of 1 Nm or the actuating torque if this is greater, is applied 100 times in the direction opposite to the direction of operation.*

*During the test, the knob shall not become detached.*

NOTE Requirements for the fixation of other types of actuating members are under consideration.

**12.106** Screws or other means for mounting the switch on a surface or in a box or enclosure apart from panel mounting shall be easily accessible from the front. These means shall not serve any other fixing purpose.

**12.107** Other electrical accessories combined with switches shall comply with the requirements of the standard for the accessory in question.

**12.108** Switches other than those with degree of protection IPX0 shall be totally enclosed when fitted with conduits or cables.

Surface-type switches other than those with degree of protection IPX0 shall have provision for opening a drain hole at least 5 mm in diameter, or 20 mm<sup>2</sup> in area with a width and length of at least 3 mm.

The drain hole shall be effective in at least two positions of the switch when this is mounted on a vertical wall, one of these with the conductors entering at the top and the other with the conductors entering at the bottom.

*Compliance is checked by measurement and by inspection during the relevant tests of 14.32.*

NOTE A drain hole in the back of the enclosure is deemed to be effective only if the design of the enclosure ensures a clearance of at least 5 mm from the wall, or provides a drainage channel of at least the size specified.

**12.109** Switches to be installed in a box shall be so designed that the conductor ends can be prepared after the box is mounted in position, but before the switch is fitted in the box.

In addition, the base shall have adequate stability when mounted in the box.

*Compliance is checked by inspection and by an installation test with the appropriate cable with conductors of the largest cross-sectional areas specified, for the relevant terminal size, in Table-3 4.*

**12.110** Single pole surface type switches of an IP degree higher than X0 with an enclosure having more than one inlet opening shall be provided with an additional terminal for maintaining the continuity of a second current carrying conductor and complying with the appropriate requirements of Clause-10 11, or with an adequate space for a floating terminal.

*Compliance is checked by inspection and by the relevant tests of Clause 11.*

NOTE For switches for Class I appliances, this terminal is additional to the terminal required according to Clause 10-10+.

**12.111** Inlet openings shall allow the introduction of the conduit or the protective covering of the sheathed cable so as to afford complete mechanical protection.

IPX0 surface-type switches shall be so constructed that the conduit or protective covering can enter at least 1 mm into the enclosure.

In IPX0 surface-type switches, the inlet opening for conduit entries, or at least two of them if there are more than one, shall be capable of accepting conduit sizes of 16, 20, 25 or 32 or a combination of at least two of any of these sizes.

*Compliance is checked by inspection during the test of 12.109 and by measurement.*

NOTE Inlet openings of adequate size may can also be obtained by the use of knock-outs or of suitable insertion pieces.

If ordinary surface-type switches are intended for back entry from a conduit they shall be so designed that they have provision for back entry from a conduit perpendicular to the mounting surface of the switch.

*Compliance is checked by inspection.*

If the switch is provided with membranes in inlet openings, these shall be replaceable.

*Compliance is checked by inspection.*

**12.112** Switches classified according to 7.4-102.2 shall have cord anchorages at the declared outlet facilities for flexible cables such that the conductors are relieved from strain, including twisting, where they are connected to the terminals, and such that their covering is protected from abrasion and kept in position.



**12.112.1** It shall be clear how the relief from strain and the prevention of twisting is intended to be effected.

**12.112.2** The inlet or bushing shall be provided with a smoothly rounded opening.

**12.112.3** Makeshift methods such as tying the cable into a knot, or tying the ends with string shall not be used.

**12.112.4** Cord anchorages of switches shall be of insulating material, or, if of metal, be insulated from accessible metal parts or accessible insulating surfaces, by insulation complying with the requirements for supplementary insulation.

The cord anchorages shall be so designed that their parts do not fall out when the cover is removed, even if the switches are not fitted with their cables.

**12.112.5** Cord anchorages shall further be so designed that:

- for any attachment method, the cable is not fixed by penetration of its insulation in such a way that the insulation of the cable is cut or otherwise significantly damaged.  
**NOTE** A slight deformation of the insulation, in such a way that the insulation of the cable is not cut or otherwise significantly damaged, is allowed;
- the cable cannot touch clamping screws of the cord anchorage if these screws are accessible or electrically connected to accessible metal parts;
- the cable is not clamped by a screw which bears directly on the cable, except where the screw is made of insulating material;
- at least one part is securely fixed to the switch;
- replacement of the cable does not require the use of a special purpose tool;
- they are suitable for the different types of cables which may be connected.

**12.112.6** Cord anchorages shall be so designed and located that replacement of the cable is easily possible.

**12.112.7** Screws, if any, which have to be operated when replacing the cable, shall not serve to fix any other component, unless either the switch is rendered inoperable or manifestly incomplete if they are omitted or incorrectly replaced, or the component intended to be fixed cannot be removed without the aid of a tool when replacing the cable.

*Compliance is checked by inspection and by a pull test in an apparatus similar to that shown in Figure 101, followed by a torque test in an apparatus similar to that shown in Figure 102:*

- *three new switches are tested with ~~PVC sheathed~~ cables as declared by the manufacturer having the smallest and largest cross-sectional area as specified in Table ~~102~~ 101. Before the test the free length of the cable shall be cut to 150 mm ± 5 mm;*
- *switches provided with entries specially designed for the connection of PVC insulated flat cables (60227 IEC 52) are tested with flat cables only.*

**Table 101 – Rated currents for resistor loads and related types of cables**

Rated current for resistor load  A	Number of cores	Nominal cross-sectional area of each conductor  mm <sup>2</sup>	Types of cables	Overall diameter				
				Min.  mm	Max.  mm			
Up to and including 3	2	0,5	60227 IEC 52	4,8	6,0			
		0,75	60227 IEC 52	5,2	6,4			
			60227 IEC 52 fl	3,2 × 5,2	3,0 × 6,4			
	3	0,5	60227 IEC 52	5,0	6,2			
		0,75	60227 IEC 52	5,4	6,8			
Over 3 and up to and including 6	2	0,75	60227 IEC 52	5,2	6,4			
			60227 IEC 52 fl	3,2 × 5,2	3,0 × 6,4			
			60227 IEC 53	6,0	7,6			
			60227 IEC 53 fl	3,8 × 6,0	5,2 × 7,6			
	3	0,75	60227 IEC 52	5,4	6,8			
			60227 IEC 53	6,4	8,8			
	4	1,0	60227 IEC 53	7,6	9,4			
Over 6 and up to and including 16	2	0,75	60227 IEC 52	5,2	6,4			
			60227 IEC 52 fl	3,2 × 5,2	3,0 × 6,4			
			60227 IEC 53	6,0	7,6			
			60227 IEC 53 fl	3,8 × 6,0	5,2 × 7,6			
		1,0	60227 IEC 53	6,4	8,0			
			1,5	60227 IEC 53	7,4	9,0		
	3	0,75	60227 IEC 52	5,4	6,8			
			60227 IEC 53	6,4	8,0			
			1,0	60227 IEC 53	6,8	8,4		
			1,5	60227 IEC 53	8,0	9,8		
	4	1,0	60227 IEC 53	7,6	9,4			
			1,5	60227 IEC 53	9,0	11,0		
			Over 16 and up to and including 25	2	1,5	60227 IEC 53	7,4	9,0
				3			8,0	9,8
4	4	60245 IEC 66		9,6	12,5			
				9,0	11,0			
				14,5	18,0			
Over 25 and up to and including 32	2	2,5		60227 IEC 53	8,0	11,0		
	3		13,5		18,5			
	4	6	60245 IEC 66	9,6	12,0			
				14,5	20,0			
				40,5	13,0			
				16,5	22,0			
Over 32 and up to and including 40	2	4	60227 IEC 53	10,0	12,0			
	3			11,0	13,0			
				20,0	25,5			

Rated current for resistor load A	Number of cores	Nominal cross-sectional area of each conductor mm <sup>2</sup>	Types of cables	Overall diameter	
				Min. mm	Max. mm
	4	10	60245 IEC 66	12,0 21,5	14,0 28,0
Over 40 and up to and including 63	2	4	60227 IEC 53	10,0 18,5	12,0 24,0
	3			11,0 20,0	13,0 25,5
	4			12,0 21,5	14,0 28,0
		10	60245 IEC 66	12,0 21,5	14,0 28,0

Conductors of the cable are introduced into the terminals, and the terminal metal screws are tightened just sufficiently to prevent the conductors from easily changing their position.

The cord anchorage is used in the normal way, metal clamping screws being tightened with two-thirds of the torque specified in Table ~~16~~ 10 and clamping screws of insulating material with two-thirds of the torque specified in Table ~~104~~ 103. After reassembly of the switch, its component parts shall fit snugly and it shall not be possible to push the cable into the switch to any appreciable extent.

The switch is first fixed in a test apparatus similar to that shown in Figure 101 so that the axis of the cable is vertical where it enters the switch. The cable is then subjected 100 times to a pull of:

- 60 N if the rated current is not more than 16 A;
- 100 N if the rated current is more than 16 A.

The pulls are applied without jerks, each time for 1 s.

Immediately after this test, the cable is subjected for 1 min to a torque as specified in Table ~~103~~ 102 with an apparatus similar to that shown in Figure 102.

**Table ~~103~~ 102 – Torque values for torque test**

Rated current for resistor load	Flexible cable				
	2 × 0,5	2 × 0,75	3 × 0,5	3 × 0,75	2 ... 5 × 1 (or larger)
Up to and including 16 A	0,1 Nm	0,15 Nm	0,15 Nm	0,25 Nm	0,25 Nm
Over 16 A					0,425 Nm

The torque is applied as near as possible to the switch.

During the tests, neither the cable nor the switch shall be damaged within the meaning of this document. After the tests, the cable shall not have been displaced longitudinally by more than 2 mm, and there shall be no appreciable strain at the connection. Creepage distances and clearances shall not have been reduced below the value specified in Clause 20.

For the measurement of the longitudinal displacement a mark is made on the cable while it is subjected to the first pull. After the tests the displacement of the mark on the cable in relation to the switch is measured while the cable is subjected to an additional pull.

**12.112.8** Switches shall be designed so that the cables incur no damage due to the bending likely to occur in normal use.

Cord guards shall not be integral with the cable.

Exempted from this requirement are switches with terminals classified according to ~~7.2.3~~ 7.20.2, where the method of attachment is such that the cable can be replaced without the aid of a special purpose tool by a special cable with for example a moulded-on cord guard. For those terminals it shall not be possible to fit a cable without a cord guard during servicing.

*Compliance is checked by subjecting the switch, fitted with the cable, or range of cables, for which it is designed, to the following tests.*

*The switch is mounted in the flexing apparatus similar to that shown in Figure 103. For the purpose of the test, the following conditions apply.*

- a) The test is performed only once with a cable of the maximum dimension attached.*
- b) For switches having a rated current over 3 A, a cable of type 60227 IEC 53 shall be used.*

*The axis of oscillation is so chosen that the weight attached to the cable, and the cable itself, make the minimum lateral movement during the test. Switches with flat cables are mounted so that the major axis of the cross-section is parallel to the axis of oscillation. Each cable passing through the inlet opening is loaded with a weight having a mass of 1 kg. A current equal to the current passing through that particular core when the switch is operated at rated voltage is passed through each core, the voltage between the cores being the maximum rated voltage. The oscillating member is moved backwards and forwards through an angle of 22,5° (on either side of the vertical), the number of flexings (that is one movement through 45°) being 5 000, and the rate of the flexing being 60 flexings per minute.*

*During the test there shall be no interruption of the test current and no short circuit between conductors.*

*After the test, the switch shall show no damage within the meaning of this document.*

**12.112.9** The space for the external conductors inside the switch shall be adequate to allow the conductors to be easily introduced and connected, and the cover, if any, fitted without risk of damage to the conductors or their insulation. ~~It shall be possible to check that the conductors are correctly connected and positioned before the cover is fitted.~~

*Compliance is checked by inspection and by connecting cables with cores of the maximum cross-sectional area ~~specified in table 102~~ according to Table 101.*

**12.112.10** Switches with terminals for the connection of the earth conductor (earthing continuity) and classified according to ~~7.2.8~~ 7.20.4 or 7.20.5 shall be designed with ample space for slack of the protective earth conductor in such a way that, if the strain relief should fail, the connection of the protective earth conductor is subjected to strain after the connections of the current-carrying conductors and that, in case of excessive stresses, the protective earth conductor will break after the current-carrying conductors.

*Compliance is checked by the following test:*

- the cable is connected to the switch in such a way that the current-carrying conductors are led from the strain relief to the corresponding terminals along the shortest possible path;*
- after they are correctly connected, the core of the protective earth conductor is led to its terminal and cut off at a distance 8 mm longer than necessary for its correct connection;*
- the protective earth conductor is then connected to its terminal. ~~It must~~ shall then be possible to house the loop, which is formed by the protective earth conductor owing to its*

*surplus length, freely in the wiring space without squeezing or pressing the core when the cover of the switch is remounted and fixed correctly.*

### 13 Mechanism

Clause 13 of IEC 61058-1:2016 is applicable.

### 14 Protection against ingress of solid foreign objects, ~~dust~~, ingress of water, and ~~protection against~~ humid conditions

Clause 14 of IEC 61058-1:2016 is applicable, except as follows.

#### 14.3 Protection against humid conditions

*Addition of the following item e) to the list:*

- e) *The switch shall show no crack visible to normal or corrected vision without magnification nor shall the material have become sticky or greasy, this being judged as follows:*
- with the forefinger wrapped in a dry piece of rough cloth, the sample is pressed with a force of 5 N;*
  - no traces of the cloth shall remain on the sample and the material of the sample shall not stick to the cloth;*
  - after the test, the samples shall show no damage which would lead to non-compliance with this document.*

*The force of 5 N can be obtained in the following way:*

- the switch is placed on one of the pans of a balance and the other pan is loaded with a mass equal to the mass of the switch plus 500 g;*
- equilibrium is then restored by pressing the switch with the forefinger, wrapped in a dry piece of rough cloth.*

*Additional subclauses:*

**14.101** *Membranes shall be reliably fixed and shall not be displaced by the mechanical and the thermal stresses occurring in normal use.*

*Compliance is checked by the following test:*

- membranes are tested when assembled in the switch;*
- first the switch is fitted with membranes which have been subjected to the treatment specified in Clause 14.101;*
- the switches are then placed for 2 h in a heating cabinet as described in Clause 14.101, the temperature being maintained at 40 °C ± 2 °C;*
- immediately after this period, a force of 30 N is applied for 5 s to various parts of the membranes by means of the tip of a straight unjointed test finger of the same dimensions as the standard test finger according to IEC 60529.*

*During these tests, the membranes shall not deform to such an extent that live parts become accessible.*

*For membranes likely to be subjected to an axial pull in normal use, an axial pull of 30 N is applied for 5 s.*

*During this test, the membranes shall not come out.*

*The test is then repeated with membranes which have not been subjected to any treatment.*

**14.102** Membranes shall be so designed and made of such material that the introduction of the cables into the switches is permitted when the ambient temperature is low.

*Compliance is checked by the following test:*

- *the switches are fitted with membranes which have not been subjected to any ageing treatment, those without openings being suitably pierced;*
- *the switches are then kept, for 2 h, in a refrigerator at a temperature of  $-15\text{ °C} \pm 2\text{ °C}$ ;*
- *after this period, the switches are removed from the refrigerator and immediately afterwards, while the switches are still cold, it shall be possible to introduce, without undue force, cables of the heaviest type through the membranes.*

*After the tests in 14.101 and 14.102, the membranes shall show no harmful deformation, cracks or similar damage which would lead to non-compliance with this document.*

## **15 Insulation resistance and dielectric strength**

Clause 15 of IEC 61058-1:2016 is applicable.

## **16 Heating**

Clause 16 of IEC 61058-1:2016 is applicable.

## **17 Endurance**

Clause 17 of IEC 61058-1:2016 is applicable.

## **18 Mechanical strength**

~~This clause of part 1 is not applicable.~~

*Replacement:*

*The mechanical strength of independently mounted switches is tested in accordance with Clause 20 of IEC 60669-1:2017.*

## **19 Screws, current-carrying parts and connections**

Clause 19 of IEC 61058-1:2016 is applicable, except as follows.

*Additional subclauses:*

### **19.101 Screws of insulating material**

Table 103 shows the torque values for insulating material screws.

**Table 103 – Torque values for insulating material screws**

Nominal diameter of thread mm		Torque Nm (+10 %/0)
Over	Up to and including	
	2,8	0,2
2,8	3,0	0,25
3,0	3,2	0,3
3,2	3,6	0,4
3,6	4,1	0,5
4,1	4,7	0,6
4,7	5,3	0,6
5,3		0,7

**19.102** If the replacement of screws of insulating material with metal screws impairs safety, ~~e.g. decreases the clearance, it shall not be possible to replace screws of insulating material by metal screws~~ for example, by decreasing the clearance, such replacement shall not be permitted.

## **20 Clearances, creepage distances and distances through insulation, solid insulation and coatings of rigid printed board assemblies**

Clause 20 of IEC 61058-1:2016 is applicable ~~except as follows~~.

~~Addition to the second paragraph of the test specification:~~

~~For the measurements the conductor shall be inserted into the terminal as far as possible and be so connected that it is uninsulated at a distance of 2 mm from the metal parts of the clamping unit at the side where it has been introduced.~~

~~If the construction is such that the core insulation is prevented from touching the metal parts of the terminal, the distance of 2 mm is measured from the outside of the obstruction as shown in figure 104.~~

~~If a longer uninsulated length is specified, this value shall be used.~~

~~The conductors are bent in the directions likely to occur during installation.~~

~~The measurements are made from the point of the obstruction which the core touches during bending and not from a point on the core closer to the core insulation.~~

## **21 Resistance to heat, fire and tracking Fire hazard**

Clause 21 of IEC 61058-1:2016 is applicable except as follows.

**21.1.3** ~~Addition:~~

~~Independently mounted switches shall be tested according to category D.~~

**21.1.4** ~~Addition:~~

~~For independently mounted switches, the glow-wire test of annex C shall be carried out at the 650 °C level.~~

#### **21.2 Addition:**

*Independently mounted switches shall be tested according to the glow-wire flammability test method for end-products (GWEPT) 850 °C in IEC 60695-2-11.*

## **22 Resistance to rusting**

Clause 22 of IEC 61058-1:2016 is applicable.

## **23 Abnormal operation and fault conditions for switches**

Clause 23 of IEC 61058-1:2016 is applicable.

## **24 Components for switches**

Clause 24 of IEC 61058-1:2016 is applicable.

## **25 EMC requirements**

Clause 25 of IEC 61058-1:2016 is applicable, except as follows.

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Addition of the following new figures:

Dimensions in millimetres

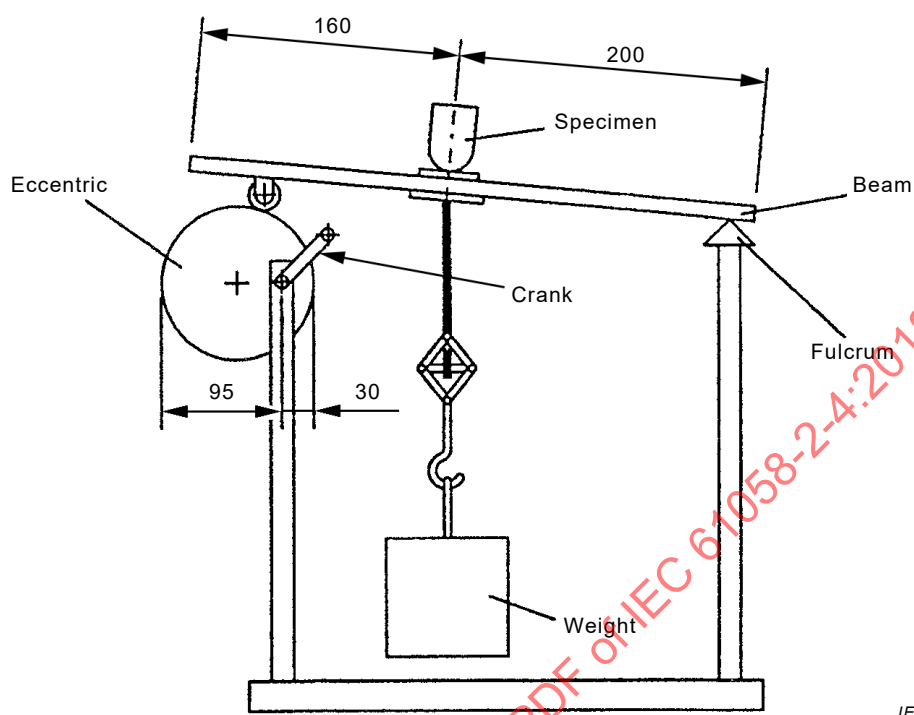
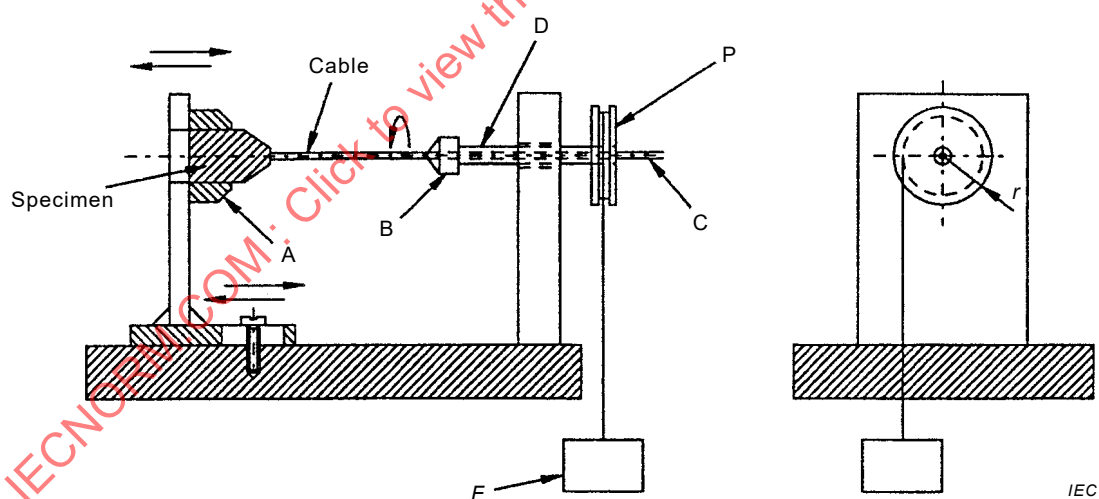


Figure 101 – Example of pull apparatus for testing the cord anchorage



- A = device for fixing the body of specimen
- B = device for fixing the cable of specimen
- C = end of the cable
- D = rotary shaft (hollow)

- $r$  = radius of pulley
- $F$  = weight; torque =  $F \times r$
- P = pulley

Figure 102 – Example of torque apparatus for testing the cord anchorage

Dimensions in millimetres

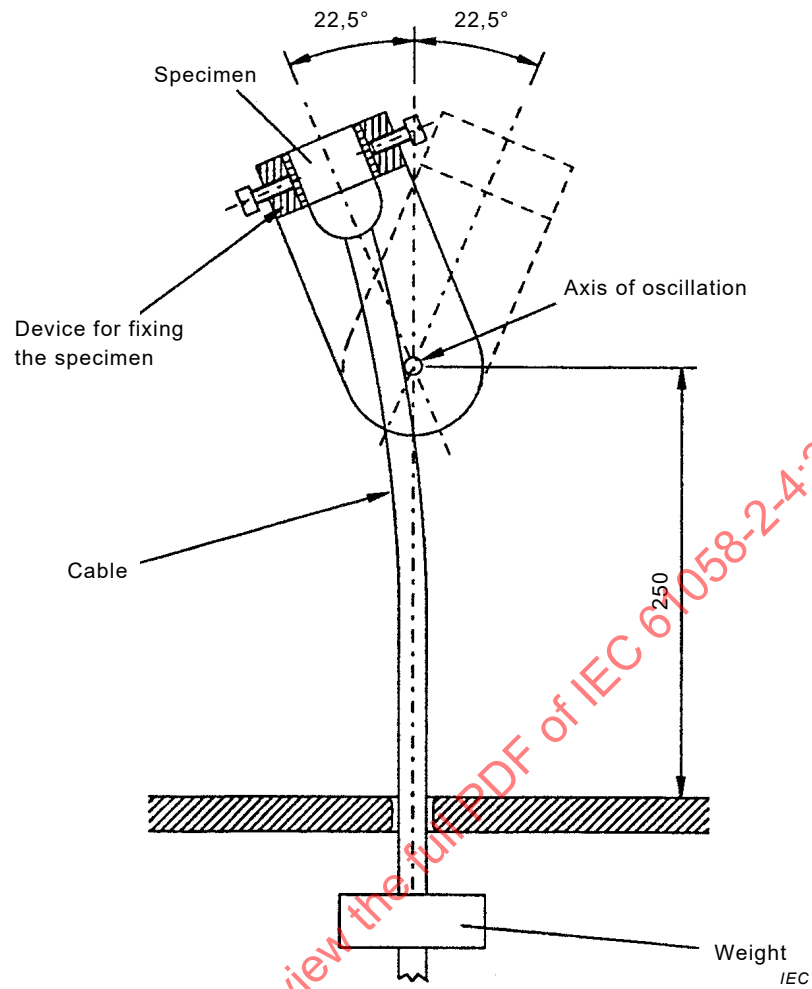
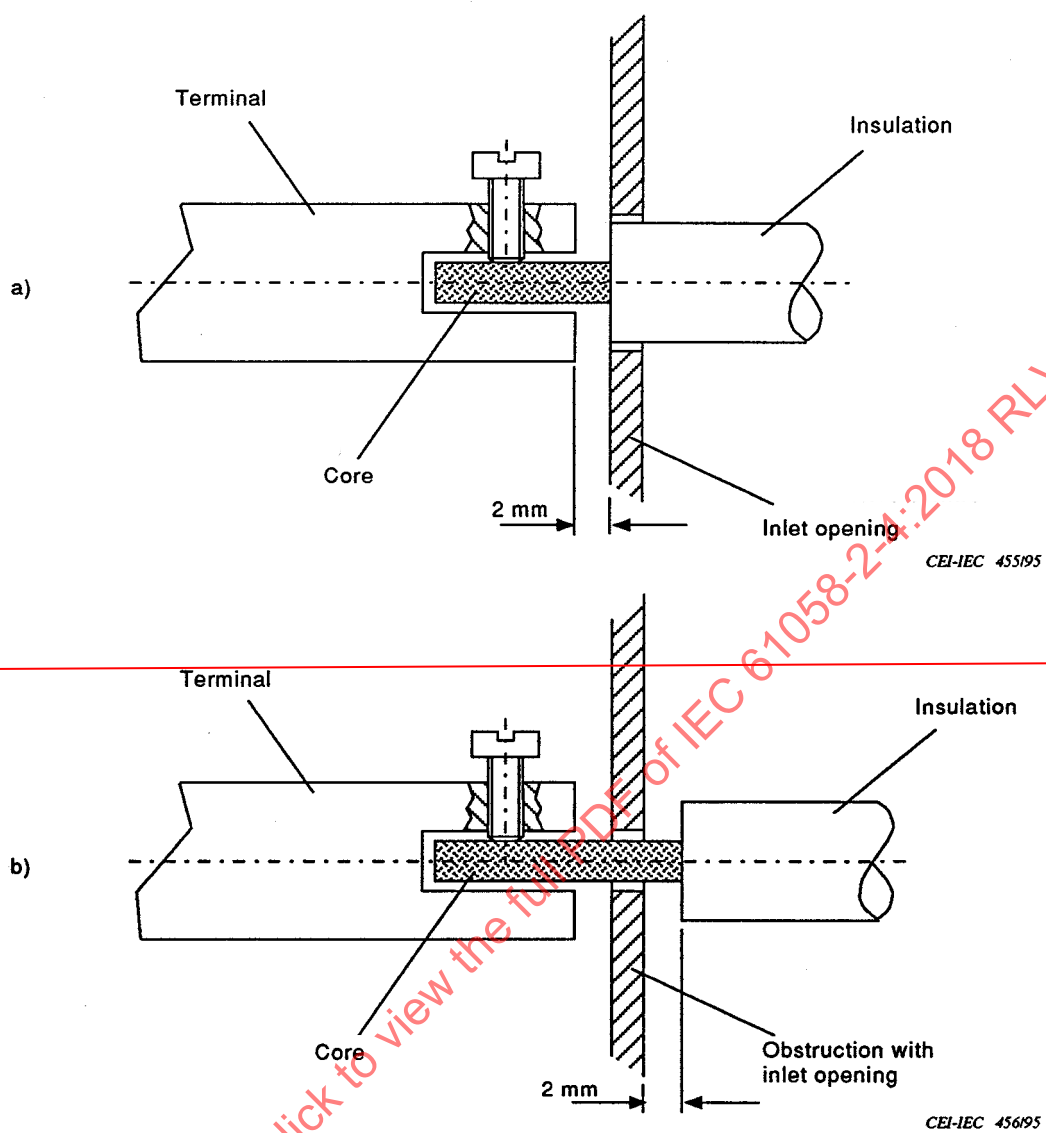


Figure 103 – Example of apparatus for flexing test



- a) = Terminal without insulation obstruction
- b) = Terminal with insulation obstruction

**Figure 104 – Examples of terminal inlet openings**

## **Annexes**

The annexes of IEC 61058-1:2016 are not applicable, except for Annexes K, L and M.

### **Annex K** (normative)

#### **Routine tests**

Annex K of IEC 61058-1:2016 is applicable.

### **Annex L** (informative)

#### **Sampling tests**

Annex L of IEC 61058-1:2016 is applicable.

### **Annex M** (normative)

#### **Switch families**

Annex M of IEC 61058-1:2016 is applicable.

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# INTERNATIONAL STANDARD

## NORME INTERNATIONALE

**Switches for appliances –**

**Part 2-4: Particular requirements for independently mounted switches**

**Interrupteurs pour appareils –**

**Partie 2-4: Exigences particulières pour les interrupteurs à montage indépendant**

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## INTERNATIONAL ELECTROTECHNICAL COMMISSION

**SWITCHES FOR APPLIANCES –****Part 2-4: Particular requirements for  
independently mounted switches****FOREWORD**

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International Standard IEC 61058-2-4 has been prepared by subcommittee 23J: Switches for appliances, of IEC technical committee 23: Electrical accessories.

This second edition cancels and replaces the first edition published in 1995 and constitutes a technical revision.

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

- a) overall format modified to support the revised structure of the series;
- b) Annexes K and M have been included as an integral part of this document;
- c) Annex L has been included for information purposes only.

The text of this International Standard is based on the following documents:

CDV	Report on voting
23J/433/CDV	23J/441/RVC

Full information on the voting for the approval of this International Standard can be found in the report on voting indicated in the above table.

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

This document is to be used in conjunction with IEC 61058-1:2016.

This document supplements or modifies the corresponding clauses in IEC 61058-1, so as to convert that publication into the IEC standard: *Particular requirements for independently mounted switches*.

When a particular subclause of IEC 61058-1 is not mentioned in this document, that subclause applies as far as reasonable. Where this document states "addition", "modification" or "replacement", the relevant text of IEC 61058-1 is to be adapted accordingly.

In this document:

- 1) the following print types are used:
  - requirements proper: in roman type;
  - *test specifications: in italic type*;
  - explanatory matter: in smaller roman type.
- 2) subclauses, figures or tables which are additional to those in IEC 61058-1 are numbered starting from 101.

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

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

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.



## SWITCHES FOR APPLIANCES –

### Part 2-4: Particular requirements for independently mounted switches

#### 1 Scope

Clause 1 of IEC 61058-1:2016 is applicable, except as follows.

*Addition:*

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

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

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

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

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

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

NOTE 3 For switches used in tropical climates, additional requirements can apply.

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

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

#### 2 Normative references

Clause 2 of IEC 61058-1:2016 is applicable except as follows.

*Addition:*

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

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

IEC 60669-1:2017, *Switches for household and similar fixed-electrical installations – Part 1: General requirements*

IEC 61058-1:2016, *Switches for appliances – Part 1: General requirements*

### 3 Terms and definitions

Clause 3 of IEC 61058-1:2016 is applicable, except as follows.

#### 3.3 Terms and definitions relating to the different types of switches

*Additional terms and definitions:*

##### 3.3.101

##### **independently mounted switch**

switch intended to be mounted away from the controlled appliance or equipment

##### 3.3.102

##### **design A switch**

switch where the cover or coverplate can be removed without displacement of the conductor(s)

##### 3.3.103

##### **design B switch**

switch where the cover or coverplate cannot be removed without displacement of the conductor(s)

### 4 General requirements

Clause 4 of IEC 61058-1:2016 is applicable.

### 5 General information on tests

Clause 5 of IEC 61058-1:2016 is applicable.

### 6 Rating

Clause 6 of IEC 61058-1:2016 is applicable.

### 7 Classification

Clause 7 of IEC 61058-1:2016 is applicable except as follows.

#### 7.5 Degree of protection against solid foreign objects

*Replacement:*

The degree of protection against solid foreign objects is declared.

With the exception of IP0X and IP1X, all IP ratings are allowed.

#### 7.11 According to resistance to ignitability by the glow wire temperature

Subclause 7.11.1 of IEC 61058-1:2016 is not applicable.

## 7.22 According to the type of forced cooling

Subclause 7.22.2 of IEC 61058-1:2016 is not applicable.

*Additional subclauses:*

### 7.101 According to design

**7.101.1** design A switch;

**7.101.2** design B switch.

NOTE 1 See definitions 3.3.102 and 3.3.103.

NOTE 2 If a switch has a base which cannot be separated from the cover or cover plate, and requires an intermediate plate which can be removed for redecorating the wall, it is considered to be of design A, provided the intermediate plate meets the requirements specified for covers and cover plates.

### 7.102 According to outlet facilities

**7.102.1** switch with inlet/outlet facilities for rigid cables;

**7.102.2** switch with inlet facilities for rigid cables and outlet facilities for flexible cables.

## 8 Marking and documentation

Clause 8 of IEC 61058-1:2016 is applicable with the following modifications to Table 3:

**Table 3 – Switch information and loads placed in groups**

*Modification:*

No.	Characteristic	Subclause	Means of information	
			Common type reference CT	Unique type reference UT
2	SWITCH ENVIRONMENT/MOUNTING			
2.1	Degree of protection provided for the switch when mounted according to documentation  (IP code of IEC 60529)  NOTE Additional letters listed in IEC 60529 are not used.	7.5 and 7.6	Marking	Marking

4	ELECTRICAL LOAD/CONNECTION			
4.1	Rated voltage or rated voltage range	6.1	Marking	Marking

*Additional rows:*

<b>101</b>	<b>SWITCH DESIGN</b>			
101.1	Type of switch design	7.101.1 and 7.101.2	Document- ation	Document- ation
<b>102</b>	<b>OUTLET FACILITIES</b>			
102.1	Type of outlet facilities	7.102	Document- ation	Document- ation

## 9 Protection against electric shock

Clause 9 of IEC 61058-1:2016 is applicable, except as follows.

### 9.1 Addition of the following sentence to a):

*The switch shall be fitted with the conductor of the smallest or largest nominal cross-sectional area according to Table 4 whichever is more unfavourable, or with a rigid conduit, a pliable conduit or a flexible conduit.*

*Addition to d):*

*This test finger, with an electrical indicator, is not applied to membranes in inlet openings and is applied to thin-walled knock-outs with a force of only 10 N.*

*Additional subclause:*

**9.101** 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 clearances and creepage distances between live parts and metal parts of the mechanism have at least the values specified in 20.2.5 and 20.4.5.

*Compliance is checked by inspection, by the test of 15.3 and, if necessary, by measurement.*

NOTE Lacquer or enamel is not considered to be insulating material for the purpose of 9.101.

## 10 Provision for earthing

Clause 10 of IEC 61058-1:2016 is applicable.

## 11 Terminals and terminations

Clause 11 of IEC 61058-1:2016 is applicable.

## 12 Construction

Clause 12 of IEC 61058-1:2016 is not applicable.

*Additional subclauses:*

**12.101** Insulating linings, barriers and the like, shall have adequate mechanical strength and shall be secured in a reliable manner.

*Compliance is checked by inspection after the tests of Clause 18.*

**12.102** Switches shall be so constructed as to permit:

- easy introduction and connection of the conductors in the terminals;
- adequate space between the underside of the base and the surface on which the base is mounted or between the sides of the base and the enclosure (cover or box) so that, after installation of the switch, the insulation of the conductors does not come in contact with live parts of different polarity or with moving parts of the mechanism, such as the spindle of a rotary switch;

NOTE This requirement does not imply that the metal parts of the terminals are necessarily protected by insulating barriers or insulating shoulders to avoid contact, due to incorrect installation of the terminal metal parts, with the insulation of the conductor.

- easy fixing of the base to a wall or in a box and correct positioning of the conductors. For surface-type switches, mounted on a mounting plate, a wiring channel may be needed to comply with this requirement.

In addition, switches classified according to 7.101.1 (design A switch) shall permit an easy positioning and removal of the cover or cover plate, without displacing the conductors.

*Compliance is checked by inspection and by an installation test with conductors of the largest cross-sectional area for the relevant terminal size, in Table 4.*

**12.103** Covers and cover plates or parts thereof, which are intended to ensure protection against electric shock, shall be held in place at two or more points by effective fixing.

Covers and cover plates or parts thereof may be fixed by means of a single fixing, for example by a screw, provided that they are retained in position by another means (e.g. by a shoulder).

It is recommended that the fixings of covers and cover plates or parts thereof be captive. The use of tight fixing washers of cardboard or the like is deemed to be an adequate method for securing screws intended to be captive.

NOTE Live parts and non-earthed metal parts separated from live parts in such a way that creepage distances and clearances have values specified in Clause 20 are not considered as accessible if the requirements of 12.103 are met.

For switches with a degree of protection IPX0, the fixing of covers or cover plates shall not serve to fix any other part, except the knobs.

When the fixings of covers or cover plates also serve to fix the base, there shall be sufficient means to maintain the base in position after removal of the cover or cover plate.

Decorative covers, cover plates or parts thereof not providing protection against electric shock are not considered as covers or cover plates within the meaning of 12.103.

*For covers and cover plates or parts thereof whose fixing is of the screw-type, compliance is checked by inspection and by an installation test.*

*For covers and cover plates or parts thereof whose fixing is not dependent on screws and whose removal is obtained by applying a force in a direction approximately perpendicular to the mounting/supporting surface, compliance is checked by applying the test described in 13.3.2 of IEC 60669-1:2017 under the conditions set out in 20.4 to 20.6 of IEC 60669-1:2017.*

**12.104** Surface-type switches with degree of protection IPX0 shall be so constructed that, when they are fixed and wired as in normal use, there are no free openings in their enclosures.

*Compliance is checked by inspection and by an installation test with conductors of the cross-sectional area specified in Table 4.*

NOTE Small gaps between enclosures and conduits or cables, or between enclosures and operating means are disregarded.

**12.105** Knobs of rotary switches shall be securely coupled to the shaft or part operating the mechanism.

*The knob is subjected for 1 min to an axial pull of 100 N.*

*In addition, for knobs of switches having only one direction of operation, a torque of 1 Nm or the actuating torque if this is greater, is applied 100 times in the direction opposite to the direction of operation.*

*During the test, the knob shall not become detached.*

NOTE Requirements for the fixation of other types of actuating members are under consideration.

**12.106** Screws or other means for mounting the switch on a surface or in a box or enclosure apart from panel mounting shall be easily accessible from the front. These means shall not serve any other fixing purpose.

**12.107** Other electrical accessories combined with switches shall comply with the requirements of the standard for the accessory in question.

**12.108** Switches other than those with degree of protection IPX0 shall be totally enclosed when fitted with conduits or cables.

Surface-type switches other than those with degree of protection IPX0 shall have provision for opening a drain hole at least 5 mm in diameter, or 20 mm<sup>2</sup> in area with a width and length of at least 3 mm.

The drain hole shall be effective in at least two positions of the switch when this is mounted on a vertical wall, one of these with the conductors entering at the top and the other with the conductors entering at the bottom.

*Compliance is checked by measurement and by inspection during the relevant tests of 14.2.*

NOTE A drain hole in the back of the enclosure is deemed to be effective only if the design of the enclosure ensures a clearance of at least 5 mm from the wall, or provides a drainage channel of at least the size specified.

**12.109** Switches to be installed in a box shall be so designed that the conductor ends can be prepared after the box is mounted in position, but before the switch is fitted in the box.

In addition, the base shall have adequate stability when mounted in the box.

*Compliance is checked by inspection and by an installation test with the appropriate cable with conductors of the largest cross-sectional areas specified, for the relevant terminal size, in Table 4.*

**12.110** Single pole surface type switches of an IP degree higher than X0 with an enclosure having more than one inlet opening shall be provided with an additional terminal for

maintaining the continuity of a second current carrying conductor and complying with the appropriate requirements of Clause 11, or with an adequate space for a floating terminal.

*Compliance is checked by inspection and by the relevant tests of Clause 11.*

NOTE For switches for Class I appliances, this terminal is additional to the terminal required according to Clause 10.

**12.111** Inlet openings shall allow the introduction of the conduit or the protective covering of the sheathed cable so as to afford complete mechanical protection.

IPX0 surface-type switches shall be so constructed that the conduit or protective covering can enter at least 1 mm into the enclosure.

In IPX0 surface-type switches, the inlet opening for conduit entries, or at least two of them if there are more than one, shall be capable of accepting conduit sizes of 16, 20, 25 or 32 or a combination of at least two of any of these sizes.

*Compliance is checked by inspection during the test of 12.109 and by measurement.*

NOTE Inlet openings of adequate size can also be obtained by the use of knock-outs or of suitable insertion pieces.

If ordinary surface-type switches are intended for back entry from a conduit they shall be so designed that they have provision for back entry from a conduit perpendicular to the mounting surface of the switch.

*Compliance is checked by inspection.*

If the switch is provided with membranes in inlet openings, these shall be replaceable.

*Compliance is checked by inspection.*

**12.112** Switches classified according to 7.102.2 shall have cord anchorages at the declared outlet facilities for flexible cables such that the conductors are relieved from strain, including twisting, where they are connected to the terminals, and such that their covering is protected from abrasion and kept in position.

**12.112.1** It shall be clear how the relief from strain and the prevention of twisting is intended to be effected.

**12.112.2** The inlet or bushing shall be provided with a smoothly rounded opening.

**12.112.3** Makeshift methods such as tying the cable into a knot, or tying the ends with string shall not be used.

**12.112.4** Cord anchorages of switches shall be of insulating material, or, if of metal, be insulated from accessible metal parts or accessible insulating surfaces, by insulation complying with the requirements for supplementary insulation.

The cord anchorages shall be so designed that their parts do not fall out when the cover is removed, even if the switches are not fitted with their cables.

**12.112.5** Cord anchorages shall further be so designed that:

- for any attachment method, the cable is not fixed by penetration of its insulation in such a way that the insulation of the cable is cut or otherwise significantly damaged. A slight

deformation of the insulation, in such a way that the insulation of the cable is not cut or otherwise significantly damaged, is allowed;

- the cable cannot touch clamping screws of the cord anchorage if these screws are accessible or electrically connected to accessible metal parts;
- the cable is not clamped by a screw which bears directly on the cable, except where the screw is made of insulating material;
- at least one part is securely fixed to the switch;
- replacement of the cable does not require the use of a special purpose tool;
- they are suitable for the different types of cables which may be connected.

**12.112.6** Cord anchorages shall be so designed and located that replacement of the cable is easily possible.

**12.112.7** Screws, if any, which have to be operated when replacing the cable, shall not serve to fix any other component, unless either the switch is rendered inoperable or manifestly incomplete if they are omitted or incorrectly replaced, or the component intended to be fixed cannot be removed without the aid of a tool when replacing the cable.

*Compliance is checked by inspection and by a pull test in an apparatus similar to that shown in Figure 101, followed by a torque test in an apparatus similar to that shown in Figure 102:*

- *three new switches are tested with cables as declared by the manufacturer having the smallest and largest cross-sectional area as specified in Table 101. Before the test the free length of the cable shall be cut to 150 mm ± 5 mm;*
- *switches provided with entries specially designed for the connection of PVC insulated flat cables (60227 IEC 52) are tested with flat cables only.*

**Table 101 – Rated currents for resistor loads and related types of cables**

Rated current for resistor load A	Number of cores	Nominal cross-sectional area of each conductor mm <sup>2</sup>	Types of cables		
Up to and including 3	2	0,5	60227 IEC 52		
		0,75	60227 IEC 52 60227 IEC 52 fl		
	3	0,5	60227 IEC 52		
		0,75	60227 IEC 52		
Over 3 and up to and including 6	2	0,75	60227 IEC 52 60227 IEC 52 fl 60227 IEC 53 60227 IEC 53 fl		
			3	0,75	60227 IEC 52 60227 IEC 53
					4
			2	0,75	
	1,0	60227 IEC 53			
					1,5



Rated current for resistor load A	Number of cores	Nominal cross-sectional area of each conductor mm <sup>2</sup>	Types of cables
	3	0,75	60227 IEC 52 60227 IEC 53
		1,0	60227 IEC 53
		1,5	60227 IEC 53
	4	1,0	60227 IEC 53
		1,5	60227 IEC 53
Over 16 and up to and including 25	2	1,5	60227 IEC 53
	3		
	4	4	60245 IEC 66
Over 25 and up to and including 32	2	2,5	60227 IEC 53
	3		
	4	6	60245 IEC 66
Over 32 and up to and including 40	2	4	60227 IEC 53
	3		
	4	10	60245 IEC 66
Over 40 and up to and including 63	2	4	60227 IEC 53
	3		
	4	10	60245 IEC 66

Conductors of the cable are introduced into the terminals, and the terminal metal screws are tightened just sufficiently to prevent the conductors from easily changing their position.

The cord anchorage is used in the normal way, metal clamping screws being tightened with two-thirds of the torque specified in Table 10 and clamping screws of insulating material with two-thirds of the torque specified in Table 103. After reassembly of the switch, its component parts shall fit snugly and it shall not be possible to push the cable into the switch to any appreciable extent.

The switch is first fixed in a test apparatus similar to that shown in Figure 101 so that the axis of the cable is vertical where it enters the switch. The cable is then subjected 100 times to a pull of:

- 60 N if the rated current is not more than 16 A;
- 100 N if the rated current is more than 16 A.

The pulls are applied without jerks, each time for 1 s.

Immediately after this test, the cable is subjected for 1 min to a torque as specified in Table 102 with an apparatus similar to that shown in Figure 102.

**Table 102 – Torque values for torque test**

Rated current for resistor load	Flexible cable				
	2 × 0,5	2 × 0,75	3 × 0,5	3 × 0,75	2 ... 5 × 1 (or larger)
Up to and including 16 A	0,1 Nm	0,15 Nm	0,15 Nm	0,25 Nm	0,25 Nm
Over 16 A					0,425 Nm

The torque is applied as near as possible to the switch.

During the tests, neither the cable nor the switch shall be damaged within the meaning of this document. After the tests, the cable shall not have been displaced longitudinally by more than 2 mm, and there shall be no appreciable strain at the connection. Creepage distances and clearances shall not have been reduced below the value specified in Clause 20.

For the measurement of the longitudinal displacement a mark is made on the cable while it is subjected to the first pull. After the tests the displacement of the mark on the cable in relation to the switch is measured while the cable is subjected to an additional pull.

**12.112.8** Switches shall be designed so that the cables incur no damage due to the bending likely to occur in normal use.

Cord guards shall not be integral with the cable.

Exempted from this requirement are switches with terminals classified according to 7.20.2, where the method of attachment is such that the cable can be replaced without the aid of a special purpose tool by a special cable with for example a moulded-on cord guard. For those terminals it shall not be possible to fit a cable without a cord guard during servicing.

Compliance is checked by subjecting the switch, fitted with the cable, or range of cables, for which it is designed, to the following tests.

The switch is mounted in the flexing apparatus similar to that shown in Figure 103. For the purpose of the test, the following conditions apply.

- The test is performed only once with a cable of the maximum dimension attached.
- For switches having a rated current over 3 A, a cable of type 60227 IEC 53 shall be used.

The axis of oscillation is so chosen that the weight attached to the cable, and the cable itself, make the minimum lateral movement during the test. Switches with flat cables are mounted so that the major axis of the cross-section is parallel to the axis of oscillation. Each cable passing through the inlet opening is loaded with a weight having a mass of 1 kg. A current equal to the current passing through that particular core when the switch is operated at rated voltage is passed through each core, the voltage between the cores being the maximum rated voltage. The oscillating member is moved backwards and forwards through an angle of 22,5° (on either side of the vertical), the number of flexings (that is one movement through 45°) being 5 000, and the rate of the flexing being 60 flexings per minute.

*During the test there shall be no interruption of the test current and no short circuit between conductors.*

*After the test, the switch shall show no damage within the meaning of this document.*

**12.112.9** The space for the external conductors inside the switch shall be adequate to allow the conductors to be easily introduced and connected, and the cover, if any, fitted without risk of damage to the conductors or their insulation.

*Compliance is checked by inspection and by connecting cables with cores of the maximum cross-sectional area according to Table 101.*

**12.112.10** Switches with terminals for the connection of the earth conductor (earthing continuity) and classified according to 7.20.4 or 7.20.5 shall be designed with ample space for slack of the protective earth conductor in such a way that, if the strain relief should fail, the connection of the protective earth conductor is subjected to strain after the connections of the current-carrying conductors and that, in case of excessive stresses, the protective earth conductor will break after the current-carrying conductors.

*Compliance is checked by the following test:*

- *the cable is connected to the switch in such a way that the current-carrying conductors are led from the strain relief to the corresponding terminals along the shortest possible path;*
- *after they are correctly connected, the core of the protective earth conductor is led to its terminal and cut off at a distance 8 mm longer than necessary for its correct connection;*
- *the protective earth conductor is then connected to its terminal. It shall then be possible to house the loop, which is formed by the protective earth conductor owing to its surplus length, freely in the wiring space without squeezing or pressing the core when the cover of the switch is remounted and fixed correctly.*

## **13 Mechanism**

Clause 13 of IEC 61058-1:2016 is applicable.

## **14 Protection against ingress of solid foreign objects, ingress of water, and humid conditions**

Clause 14 of IEC 61058-1:2016 is applicable, except as follows.

### **14.3 Protection against humid conditions**

*Addition of the following item e) to the list:*

- e) *The switch shall show no crack visible to normal or corrected vision without magnification nor shall the material have become sticky or greasy, this being judged as follows:*
- *with the forefinger wrapped in a dry piece of rough cloth, the sample is pressed with a force of 5 N;*
  - *no traces of the cloth shall remain on the sample and the material of the sample shall not stick to the cloth;*
  - *after the test, the samples shall show no damage which would lead to non-compliance with this document.*

*The force of 5 N can be obtained in the following way:*

- *the switch is placed on one of the pans of a balance and the other pan is loaded with a mass equal to the mass of the switch plus 500 g;*

- *equilibrium is then restored by pressing the switch with the forefinger, wrapped in a dry piece of rough cloth.*

*Additional subclauses:*

**14.101** Membranes shall be reliably fixed and shall not be displaced by the mechanical and the thermal stresses occurring in normal use.

*Compliance is checked by the following test:*

- *membranes are tested when assembled in the switch;*
- *first the switch is fitted with membranes which have been subjected to the treatment specified in Clause 14;*
- *the switch is then placed for 2 h in a heating cabinet as described in Clause 14, the temperature being maintained at  $40\text{ °C} \pm 2\text{ °C}$ ;*
- *immediately after this period, a force of 30 N is applied for 5 s to various parts of the membranes by means of the tip of a straight unjointed test finger of the same dimensions as the standard test finger according to IEC 60529.*

*During these tests, the membranes shall not deform to such an extent that live parts become accessible.*

*For membranes likely to be subjected to an axial pull in normal use, an axial pull of 30 N is applied for 5 s.*

*During this test, the membranes shall not come out.*

*The test is then repeated with membranes which have not been subjected to any treatment.*

**14.102** Membranes shall be so designed and made of such material that the introduction of the cables into the switches is permitted when the ambient temperature is low.

*Compliance is checked by the following test:*

- *the switches are fitted with membranes which have not been subjected to any ageing treatment, those without openings being suitably pierced;*
- *the switches are then kept, for 2 h, in a refrigerator at a temperature of  $-15\text{ °C} \pm 2\text{ °C}$ ;*
- *after this period, the switches are removed from the refrigerator and immediately afterwards, while the switches are still cold, it shall be possible to introduce, without undue force, cables of the heaviest type through the membranes.*

*After the tests in 14.101 and 14.102, the membranes shall show no harmful deformation, cracks or similar damage which would lead to non-compliance with this document.*

## **15 Insulation resistance and dielectric strength**

Clause 15 of IEC 61058-1:2016 is applicable.

## **16 Heating**

Clause 16 of IEC 61058-1:2016 is applicable.

## 17 Endurance

Clause 17 of IEC 61058-1:2016 is applicable.

## 18 Mechanical strength

*Replacement:*

*The mechanical strength of independently mounted switches is tested in accordance with Clause 20 of IEC 60669-1:2017.*

## 19 Screws, current-carrying parts and connections

Clause 19 of IEC 61058-1:2016 is applicable, except as follows.

*Additional subclauses:*

### 19.101 Screws of insulating material

Table 103 shows the torque values for insulating material screws.

**Table 103 – Torque values for insulating material screws**

Nominal diameter of thread mm		Torque Nm (+10 %/0)
Over	Up to and including	
	2,8	0,2
2,8	3,0	0,25
3,0	3,2	0,3
3,2	3,6	0,4
3,6	4,1	0,5
4,1	4,7	0,6
4,7	5,3	0,6
5,3		0,7

**19.102** If the replacement of screws of insulating material with metal screws impairs safety, for example, by decreasing the clearance, such replacement shall not be permitted.

## 20 Clearances, creepage distances, solid insulation and coatings of rigid printed board assemblies

Clause 20 of IEC 61058-1:2016 is applicable.

## 21 Fire hazard

Clause 21 of IEC 61058-1:2016 is applicable except as follows.

### 21.2 Addition:

*Independently mounted switches shall be tested according to the glow-wire flammability test method for end-products (GWEPT) 850 °C in IEC 60695-2-11.*

## 22 Resistance to rusting

Clause 22 of IEC 61058-1:2016 is applicable.

## 23 Abnormal operation and fault conditions for switches

Clause 23 of IEC 61058-1:2016 is applicable.

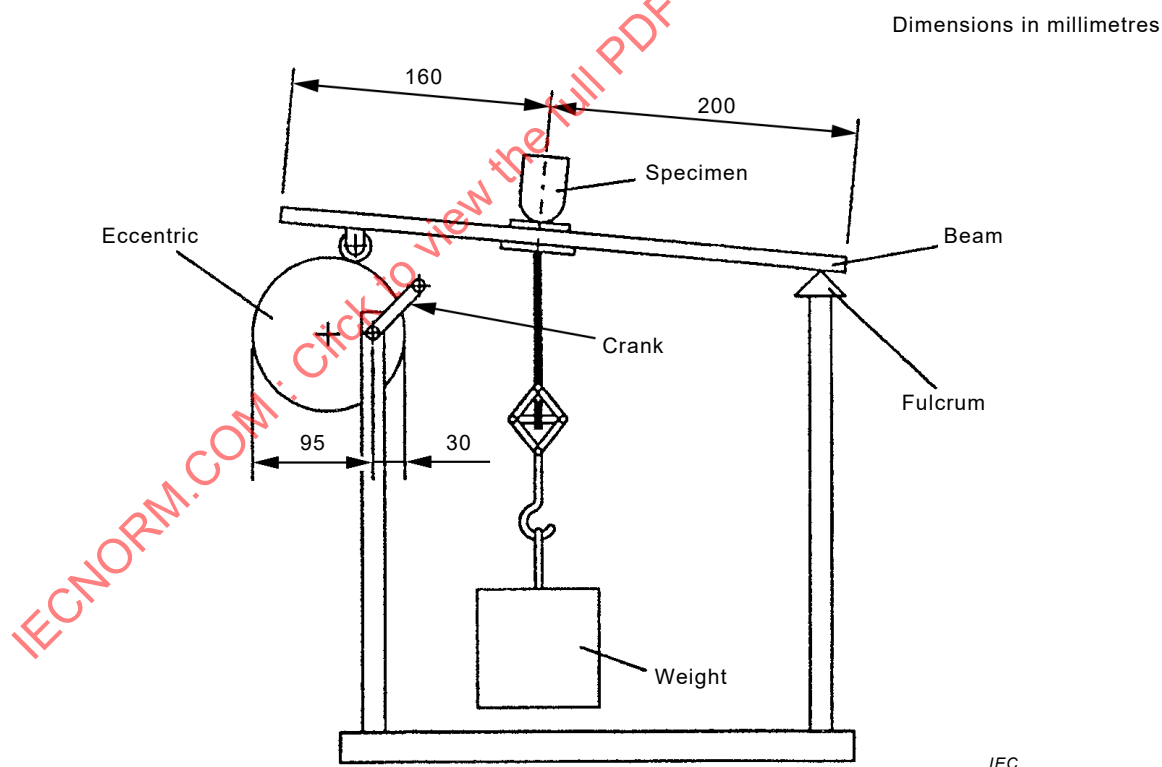
## 24 Components for switches

Clause 24 of IEC 61058-1:2016 is applicable.

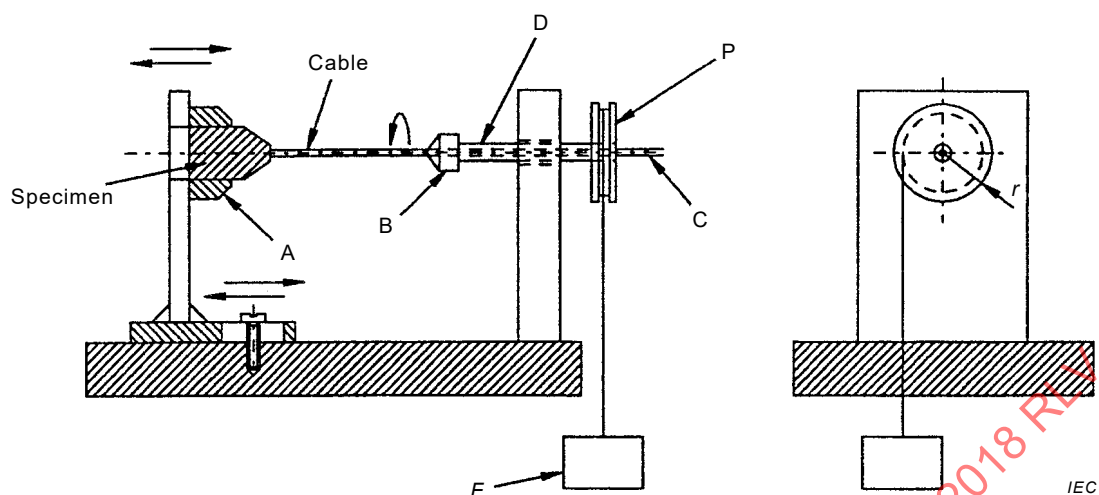
## 25 EMC requirements

Clause 25 of IEC 61058-1:2016 is applicable, except as follows.

*Addition of the following new figures:*



**Figure 101 – Example of pull apparatus for testing the cord anchorage**

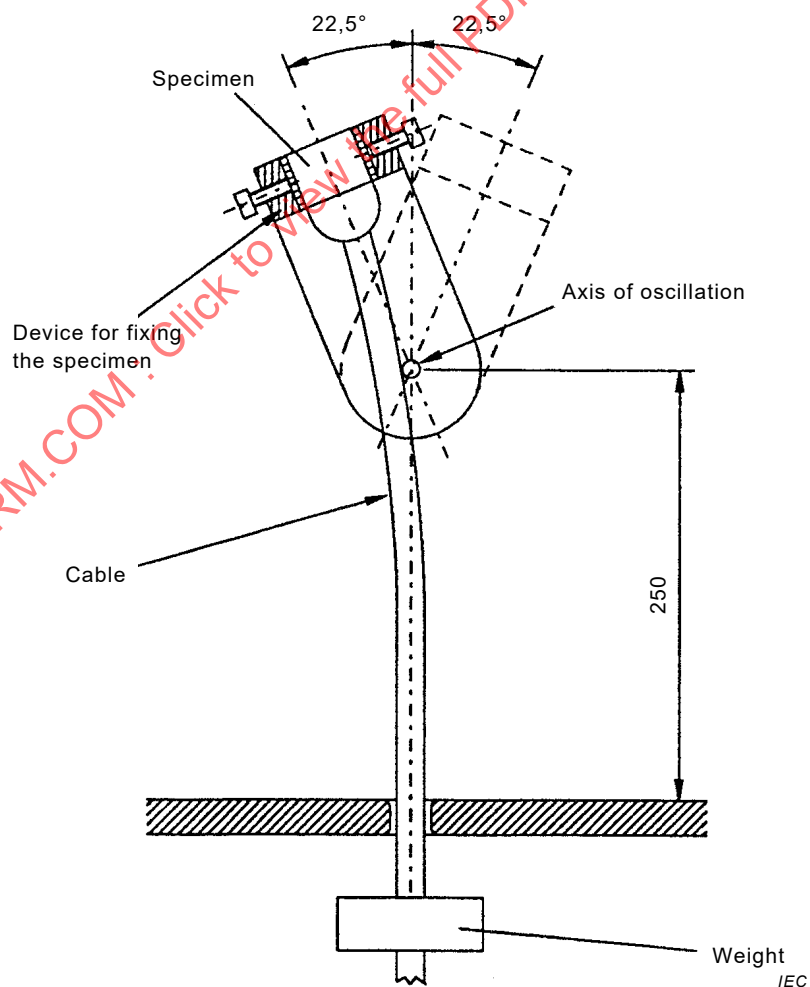


- A = device for fixing the body of specimen  
 B = device for fixing the cable of specimen  
 C = end of the cable  
 D = rotary shaft (hollow)

- $r$  = radius of pulley  
 $F$  = weight; torque =  $F \times r$   
 P = pulley

**Figure 102 – Example of torque apparatus for testing the cord anchorage**

Dimensions in millimetres



**Figure 103 – Example of apparatus for flexing test**

## **Annexes**

The annexes of IEC 61058-1:2016 are not applicable, except for Annexes K, L and M.

### **Annex K** (normative)

#### **Routine tests**

Annex K of IEC 61058-1:2016 is applicable.

### **Annex L** (informative)

#### **Sampling tests**

Annex L of IEC 61058-1:2016 is applicable.

### **Annex M** (normative)

#### **Switch families**

Annex M of IEC 61058-1:2016 is applicable.

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## COMMISSION ÉLECTROTECHNIQUE INTERNATIONALE

### INTERRUPTEURS POUR APPAREILS –

#### Partie 2-4: Exigences particulières pour les interrupteurs à montage indépendant

#### AVANT-PROPOS

- 1) La Commission Electrotechnique Internationale (IEC) est une organisation mondiale de normalisation composée de l'ensemble des comités électrotechniques nationaux (Comités nationaux de l'IEC). L'IEC a pour objet de favoriser la coopération internationale pour toutes les questions de normalisation dans les domaines de l'électricité et de l'électronique. A cet effet, l'IEC – entre autres activités – publie des Normes internationales, des Spécifications techniques, des Rapports techniques, des Spécifications accessibles au public (PAS) et des Guides (ci-après dénommés "Publication(s) de l'IEC"). Leur élaboration est confiée à des comités d'études, aux travaux desquels tout Comité national intéressé par le sujet traité peut participer. Les organisations internationales, gouvernementales et non gouvernementales, en liaison avec l'IEC, participent également aux travaux. L'IEC collabore étroitement avec l'Organisation Internationale de Normalisation (ISO), selon des conditions fixées par accord entre les deux organisations.
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La Norme internationale IEC 61058-2-4 a été établie par le sous-comité 23J: Interrupteurs pour appareils, du comité d'études 23 de l'IEC: Petit appareillage.

Cette deuxième édition annule et remplace la première édition parue en 1995, dont elle constitue une révision technique.

Cette édition inclut les modifications techniques majeures suivantes par rapport à l'édition précédente:

- a) le format global a été modifié pour être compatible avec la structure révisée de la série;
- b) les Annexes K et M ont été ajoutés pour faire partie intégrante du présent document;
- c) l'Annexe L est donnée à titre d'information uniquement.

Le texte de cette Norme internationale est issu des documents suivants:

CDV	Rapport de vote
23J/433/CDV	23J/441/RVC

Le rapport de vote indiqué dans le tableau ci-dessus donne toute information sur le vote ayant abouti à l'approbation de cette norme.

Ce document a été rédigé selon les Directives ISO/IEC, Partie 2.

Ce document doit être utilisé conjointement avec l'IEC 61058-1:2016.

Le présent document complète ou modifie les articles correspondants de l'IEC 61058-1, de façon à transformer cette publication en norme IEC: *Exigences particulières pour les interrupteurs à montage indépendant*.

Lorsqu'un paragraphe particulier de l'IEC 61058-1 n'est pas mentionné dans le présent document, ce paragraphe s'applique pour autant que cela soit raisonnable. Lorsque le présent document spécifie "addition", "modification" ou "remplacement", le texte correspondant de l'IEC 61058-1 doit être adapté en conséquence.

Dans le présent document:

- 1) les caractères suivants sont utilisés:
  - exigences: caractères romains;
  - *spécifications d'essais: en caractères italiques*;
  - notes explicatives: en petits caractères romains.
- 2) les paragraphes, figures ou tableaux qui sont ajoutés à ceux de l'IEC 61058-1 sont numérotés à partir de 101.

Une liste de toutes les parties de la série IEC 61058, publiées sous le titre général *Interrupteurs pour appareils*, peut être consultée sur le site web de l'IEC.

Le comité a décidé que le contenu de ce document ne sera pas modifié avant la date de stabilité indiquée sur le site web de l'IEC sous "<http://webstore.iec.ch>" dans les données relatives au document recherché. A cette date, le document sera

- reconduit,
- supprimé,
- remplacé par une édition révisée, ou
- amendé.

## INTERRUPTEURS POUR APPAREILS –

### Partie 2-4: Exigences particulières pour les interrupteurs à montage indépendant

#### 1 Domaine d'application

L'Article 1 de l'IEC 61058-1:2016 s'applique à l'exception de ce qui suit.

*Addition:*

Le présent document s'applique aux interrupteurs à montage indépendant (mécaniques ou électriques) pour appareils manœuvrés à la main, au pied ou par d'autres activités humaines, pour actionner ou commander des appareils électriques et autres matériels pour usage domestique et analogue, de tension assignée ne dépassant pas 480 V et de courant assigné ne dépassant pas 63 A.

Ces interrupteurs sont destinés à être manœuvrés par une personne, par l'intermédiaire d'un organe de manœuvre ou en actionnant un élément sensible. L'organe de manœuvre ou l'élément sensible peut être intégré à l'interrupteur ou être disposé séparément, soit physiquement soit électriquement, et associe l'émission d'un signal entre l'organe de manœuvre ou l'élément sensible et l'interrupteur (par exemple, électrique, optique, acoustique ou thermique).

Les interrupteurs qui comportent des fonctions de commande supplémentaires régies par le fonctionnement de l'interrupteur relèvent du domaine d'application du présent document.

Le présent document couvre également la manœuvre indirecte de l'interrupteur lorsque le fonctionnement de l'organe de manœuvre ou de l'élément sensible est assuré par une commande à distance ou par une partie d'un appareil ou équipement telle qu'une porte.

NOTE 1 Les interrupteurs électroniques peuvent être combinés à des interrupteurs mécaniques assurant une microcoupure ou une coupure totale.

NOTE 2 Les interrupteurs électroniques sans interrupteur mécanique dans le circuit d'alimentation assurent seulement une coupure électronique. Par conséquent, le circuit côté charge est toujours considéré comme étant sous tension.

NOTE 3 Pour les interrupteurs utilisés sous des climats tropicaux, des exigences supplémentaires peuvent s'appliquer.

NOTE 4 L'attention est attirée sur le fait que les normes pour appareils peuvent contenir des exigences supplémentaires ou différentes pour les interrupteurs.

NOTE 5 Dans tout le présent document, le terme "appareil" signifie "appareil ou équipement".

#### 2 Références normatives

L'Article 2 de l'IEC 61058-1:2016 s'applique à l'exception de ce qui suit.

*Addition:*

IEC 60227-5, *Conducteurs et câbles isolés au polychlorure de vinyle, de tension assignée au plus égale à 450/750 V – Partie 5: Câbles souples*

IEC 60245-4, *Conducteurs et câbles isolés au caoutchouc – Tension assignée au plus égale à 450/750 V – Partie 4: Câbles souples*

IEC 60669-1:2017, *Interrupteurs pour installations électriques fixes domestiques et analogues – Partie 1: Exigences générales*

IEC 61058-1:2016, *Interrupteurs pour appareils – Partie 1: Exigences générales*

### 3 Termes et définitions

L'Article 3 de l'IEC 61058-1:2016 s'applique à l'exception de ce qui suit.

#### 3.3 Termes et définitions relatifs aux différents types d'interrupteurs

*Termes et définitions supplémentaires:*

##### 3.3.101

##### **interrupteur à montage indépendant**

interrupteur destiné à être monté à distance de l'appareil ou de l'équipement commandé

##### 3.3.102

##### **interrupteur de conception A**

interrupteur dont le couvercle ou la plaque de recouvrement peut être enlevé sans déplacement du ou des conducteurs

##### 3.3.103

##### **interrupteur de conception B**

interrupteur dont le couvercle ou la plaque de recouvrement ne peut être enlevé sans déplacement du ou des conducteurs

### 4 Exigences générales

L'Article 4 de l'IEC 61058-1:2016 s'applique.

### 5 Informations générales sur les essais

L'Article 5 de l'IEC 61058-1:2016 s'applique.

### 6 Caractéristiques assignées

L'Article 6 de l'IEC 61058-1:2016 s'applique.

### 7 Classification

L'Article 7 de l'IEC 61058-1:2016 s'applique avec les exceptions suivantes.

*Remplacement:*

#### 7.5 Selon le degré de protection contre les corps solides étrangers

*Remplacement:*

Le degré de protection contre les corps solides étrangers est déclaré.

À l'exception de l'IP0X et de l'IP1X, tout autre degré de protection IP est permis.

**7.11 Selon la résistance à l'inflammabilité à la température du fil incandescent**

Le paragraphe 7.11.1 de l'IEC 61058-1:2016 ne s'applique pas.

**7.22 Selon le type de refroidissement forcé**

Le paragraphe 7.22.2 de l'IEC 61058-1:2016 ne s'applique pas.

*Paragraphes supplémentaires:*

**7.101 Selon la conception**

**7.101.1** interrupteur de conception A;

**7.101.2** interrupteur de conception B.

NOTE 1 Voir les définitions 3.3.102 et 3.3.103.

NOTE 2 Si un interrupteur a une base qui fait corps avec son couvercle ou sa plaque de recouvrement et exige une plaque accessoire qui peut être enlevée lors de travaux de décoration murale, il est considéré comme étant de conception A, à condition que la plaque accessoire respecte les exigences spécifiées pour les couvercles et les plaques de recouvrement.

**7.102 Selon les dispositifs de sortie de câble**

**7.102.1** interrupteur avec des dispositifs d'entrée et de sortie pour câbles rigides;

**7.102.2** interrupteur avec des dispositifs d'entrée pour câbles rigides et des dispositifs de sortie pour câbles souples.

**8 Marquage et documentation**

L'Article 8 de l'IEC 61058-1:2016 s'applique avec les modifications suivantes dans le Tableau 3.

**Tableau 3 – Informations relatives aux interrupteurs et aux charges placées dans les groupes**

*Modification:*

N°	Caractéristique	Paragraphe	Moyen d'information	
			Référence commune de type CT	Référence unique de type UT
2	ENVIRONNEMENT DE L'INTERRUPTEUR/MONTAGE			
2.1	Degré de protection fourni par l'interrupteur lorsqu'il est monté selon la documentation  (code IP de l'IEC 60529)  NOTE Les autres lettres répertoriées dans l'IEC 60529	7.5 et 7.6	Marquage	Marquage



N°	Caractéristique	Paragraphe	Moyen d'information	
			Référence commune de type CT	Référence unique de type UT
	ne sont pas utilisées.			

<b>4</b>	<b>CHARGE ÉLECTRIQUE/CONNEXION</b>			
4.1	Tension assignée ou plage des tensions assignées	6.1	Marquage	Marquage

*Lignes supplémentaire:*

<b>101</b>	<b>CONCEPTION D'INTERRUPTEUR</b>			
101.1	Type de conception d'interrupteur	7.101.1 et 7.101.2	Documenta-tion	Documenta-tion
<b>102</b>	<b>DISPOSITIFS DE SORTIE</b>			
102.1	Type de dispositif de sortie	7.102	Documenta-tion	Documenta-tion

## 9 Protection contre les chocs électriques

L'Article 9 de l'IEC 61058-1:2016 s'applique avec les exceptions suivantes.

### 9.1 Ajout de la phrase suivante au point a):

*L'interrupteur doit être équipé du câble de la plus petite ou de la plus grande section nominale spécifiée au Tableau 4, selon la plus défavorable des deux, ou avec un conduit rigide, un conduit pliable ou un conduit flexible.*

*Ajout au point d):*

*Ce doigt d'épreuve équipé d'un indicateur électrique n'est pas appliqué sur les membranes des orifices d'entrée et est appliqué aux parties défonçables en paroi mince avec une force de 10 N seulement.*

*Paragraphe complémentaire:*

**9.101** Les interrupteurs manœuvrés à l'aide d'une clé amovible ou d'un organe intermédiaire, tel qu'un cordon, une chaînette ou une tringle, doivent être conçus de telle façon que la clé ou l'organe intermédiaire ne puisse toucher que des parties isolées des parties actives.

La clé ou l'organe intermédiaire doit être isolé des parties métalliques du mécanisme, à moins que les distances d'isolement dans l'air et les lignes de fuite entre les parties actives et les parties métalliques du mécanisme ne soient au moins égales aux valeurs spécifiées en 20.2.5 et en 20.4.5.

*La conformité est vérifiée par examen, par l'essai du 15.3 et, si nécessaire, par des mesures.*

NOTE La laque ou l'émail n'est pas considéré comme étant un matériau isolant dans le cadre du 9.101.