BRITISH STANDARD

BS EN
61058-2-4:2005

Switches for appliances —

Part 2-4: Particular requirements for independently mounted switches

The European Standard EN 61058-2-4:2005 has the status of a British Standard

ICS 29.120.40

BSI
British Standards

National foreword

This British Standard is the official English language version of EN 61058-2-4:2005. It is identical with IEC 61058-2-4:2005.

The UK participation in its preparation was entrusted to Technical Committee EPL/23, Switches for appliances and electronic equipment, which has the responsibility to:

— aid enquirers to understand the text;

— present to the responsible international/European committee any enquiries on the interpretation, or proposals for change, and keep UK interests informed;

— monitor related international and European developments and promulgate them in the UK.

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EUROPEAN STANDARD **EN 61058-2-4**

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English version

Switches for appliances
Part 2-4: Particular requirements for independently mounted switches
(IEC 61058-2-4:1995 + A1:2003)

Interrupteurs pour appareils
Partie 2-4: Règles particulières pour
les interrupteurs à montage indépendant
(CEI 61058-2-4:1995 + A1:2003)

Geräteschalter
Teil 2-4: Besondere Anforderungen
an unabhängig montierte Schalter
(IEC 61058-2-4:1995 + A1:2003)

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CENELEC
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Comité Européen de Normalisation Electrotechnique
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Ref. No. EN 61058-2-4:2005 E

Foreword

The text of the International Standard IEC 61058-2-4:1995, prepared by SC 23J, Switches for appliances, of IEC TC 23, Electrical accessories, was submitted to the Unique Acceptance Procedure and was approved by CENELEC as EN 61058-2-4 on 2005-06-01 without any modification.

The following dates were fixed:

– latest date by which the EN has to be implemented at national level by publication of an identical national standard or by endorsement	(dop)	2006-06-01
– latest date by which the national standards conflicting with the EN have to be withdrawn	(dow)	2008-06-01

Annex ZA has been added by CENELEC.

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Endorsement notice

The text of the International Standard IEC 61058-2-4:1995 was approved by CENELEC as a European Standard without any modification.

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SWITCHES FOR APPLIANCES –

Part 2-4: Particular requirements for independently mounted switches

1 Scope

This clause of part 1 is applicable except as follows:

1.1 *Replacement:*

This International Standard 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 may 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 standard.

This standard 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 a part of an appliance or equipment such as a door.

NOTE 1 Electronic switches may 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.

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

NOTE 5 Throughout this standard, the word “appliance” means “appliance or equipment”.

1.2 This subclause of Part 1 is not applicable

1.3 This subclause of Part 1 is applicable.

1.4 This subclause of Part 1 is not applicable.

2 Normative references

This clause of part 1 is applicable except as follows:

Addition:

IEC 60227-3:1997, *Polyvinyl chloride insulated cables of rated voltages up to and including 450/750 V – Part 3: Non-sheathed cables for fixed wiring*

3 Definitions

This clause of part 1 is applicable, except as follows:

Additional 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 conductors

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

4 General requirement

This clause of part 1 is applicable.

5 General notes on tests

This clause of part 1 is applicable.

6 Rating

This clause of part 1 is applicable.

7 Classification

This clause of part 1 is applicable, except as follows:

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.

7.1.15.2 This subclause of Part 1 is not applicable.

Additional subclauses:

7.1.101 According to design:

7.1.101.1 – design A switch;

7.1.101.2 – 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.

7.1.102 According to outlet facilities:

7.1.102.1 – switch with inlet/outlet facilities for rigid cables;

7.1.102.2 – switch with inlet facilities for rigid cables and outlet facilities for flexible cables.

8 Marking and documentation

This clause of Part 1 is applicable with the following modifications in Table 3:

Table 3 – Switch information

No.	Characteristic	Subclause	Means of information	
			Common type reference C.T.	Unique type reference U.T.
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.	7.1.5.1 and 7.1.5.2	Ma	Ma
4	ELECTRICAL LOAD/CONNECTION			
4.1	Rated voltage or rated voltage range	6.1	Ma	Ma
101	SWITCH DESIGN			
101.1	Type of switch design	7.1.101	Do	Do
102	OUTLET FACILITIES			
102.1	Type of outlet facilities	7.1.102	Do	Do

Addition:

Table 101 – Switch information

No.		Subclause		
	Switch with unique-type-reference ..... U.t. Switch with common-type-reference ..... C.T.			
101	SWITCH DESIGN			
101.1	Type of switch design	7.1.101	Do	Do
102	OUTLET FACILITIES			
102.1	Type of outlet facilities	7.1.102	Do	Do

9 Protection against electric shock

This clause of part 1 is applicable except as follows:

9.1 *Add 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 b):

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 20.1.4 and 20.2.4.

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 this clause.

10 Provision for earthing

This clause of part 1 is applicable, except as follows:

Additional subclause:

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

11 Terminals an terminations

This clause of part 1 is applicable, except as follows:

Table 4 *Additional note:*

NOTE Switches with a rated current of 10 A and less shall have terminals accepting conductors having a cross-sectional area of 1,5 mm^2.

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

This clause of part 1 is not applicable.

Replacement:

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 contacts, 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 7.1.101.1 (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 of them, 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 of them may be fixed by means of a single fixing, e.g. 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 of them 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 this subclause 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 serve also 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 in the meaning of this subclause.

12.103.1 *For covers and cover plates or parts of them, 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 of them, 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 of 13.3.2 under the conditions of 20.4 to 20.6 of IEC 60669-1.*

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 neglected.

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^2 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 14.3.

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 10.101.

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 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 they shall be replaceable.

Compliance is checked by inspection.

12.112 Switches classified according to 7.1.102.2 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 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 having the smallest and largest cross-sectional area as specified in table 102. 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 102 – Rated currents for resistor loads and related type of cables

Rated current for resistor load A	Number of cores	Nominal cross-sectional area mm²	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	3,9 × 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	3,9 × 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	3,9 × 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			7,4	9,0
				12,0	15,0
	3	1,5	60227 IEC 53	8,0	9,8
				9,6	12,5
	4	4	60245 IEC 66	9,0	11,0
				14,5	18,0
Over 25 and up to and including 32	2			8,9	11,0
				13,5	18,5
	3	2,5	60227 IEC 53	9,6	12,0
				14,5	20,0
	4	6	60245 IEC 66	10,5	13,0
				16,5	22,0
Over 32 and up to and including 40	2			10,0	12,0
				18,5	24,0
	3	4	60227 IEC 53	11,0	13,0
				20,0	25,5
	4	10	60245 IEC 66	12,0	14,0
				21,5	28,0
Over 40 and up to and including 63	2			10,0	12,0
				18,5	24,0
	3	4	60227 IEC 53	11,0	13,0
				20,0	25,5
	4	10	60245 IEC 66	12,0	14,0
				21,5	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 and clamping screws of insulating material with two-thirds of the torque specified in table 104. 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 with an apparatus similar to that shown in figure 102.

Table 103 – 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 standard. 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, 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 standard.

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 102.

12.112.10 Switches with terminals for the connection of the earth conductor (earthing continuity) and classified according to 7.2.8 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 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

This clause of part 1 is applicable.

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

This clause of part 1 is applicable except as follows:

14.3 e) *Addition:*

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 standard.*

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 14.101;*
– *the switches are then placed for 2 h in a heating cabinet as described in 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 °C ± 2 °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 standard.

15 Insulation resistance and dielectric strength

This clause of part 1 is applicable.

16 Heating

This clause of part 1 is applicable.

17 Endurance

This clause of part 1 is applicable.

18 Mechanical strength

This clause of part 1 is not applicable.

The mechanical strength of independently mounted switches is tested in accordance with clause 20 of IEC 60669-1.

19 Screws, current-carrying parts and connections

This clause of part 1 is applicable except as follows:

Additional subclause:

19.101 Screws of insulating material

Table 104 – Torque values for screws of insulating material

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 impairs safety, e.g. decreases the clearance, it shall not be possible to replace screws of insulating material by metal screws.

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

Under consideration.

21 Resistance to heat and fire

This clause of part 1 is applicable except as follows:

21.1.3 *Addition:*

Independently mounted switches shall be tested according to level 3.

22 Resistance to rusting

This clause of part 1 is applicable.

23 Abnormal operation and fault conditions for electronic switches

This clause of Part 1 is applicable.

24 Components

This clause of Part 1 is applicable.

25 EMC requirements

This clause of Part 1 is applicable.

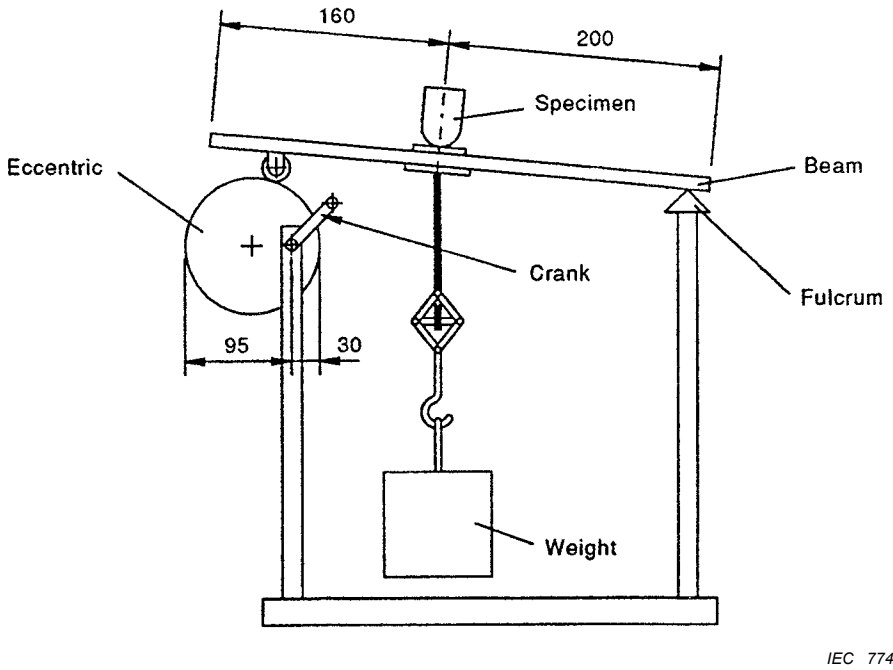
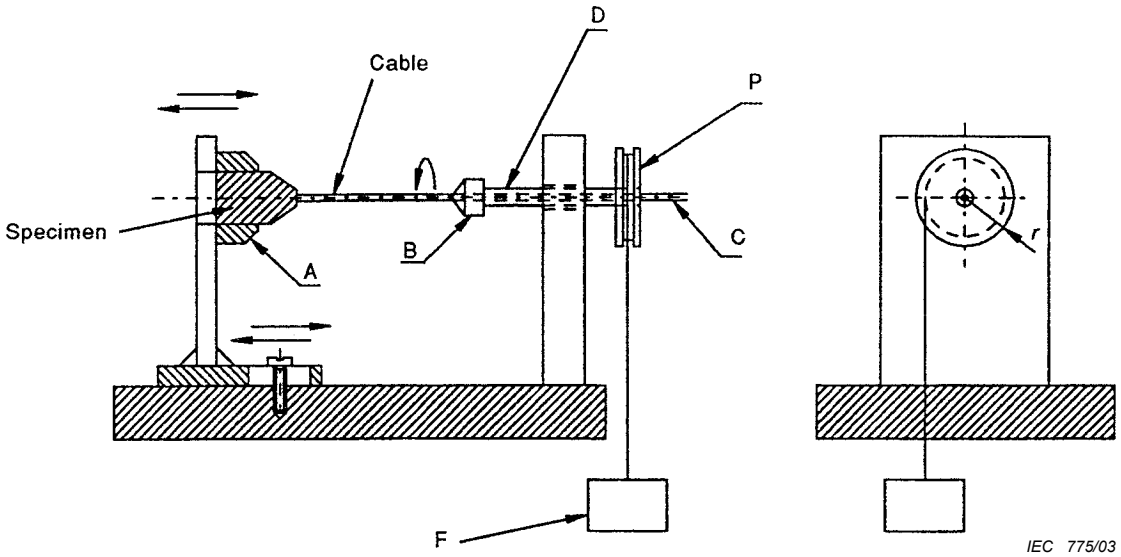


Figure 101 – Example of pull apparatus for testing the cord anchorage



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 × *r*
P = pulley

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

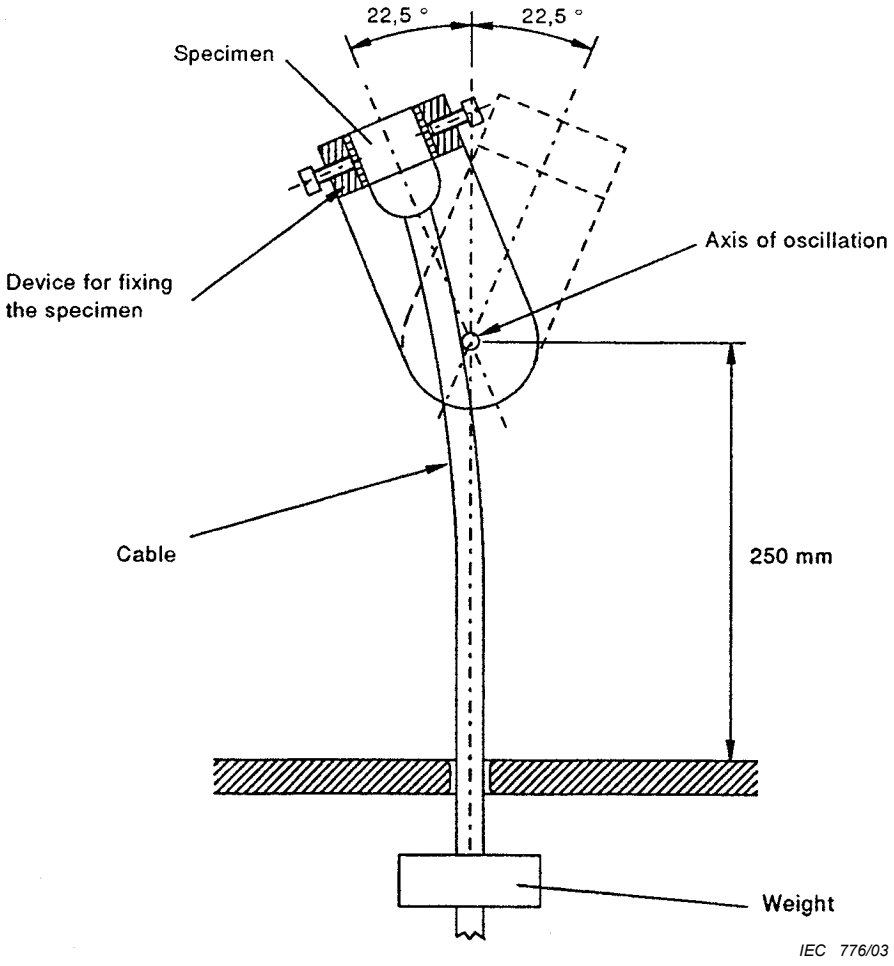


Figure 103 – Example of apparatus for flexing test

Annex R
(normative)

Routine tests

This annex of Part 1 is applicable.

Annex S
(informative)

Sampling tests

This annex of Part 1 is applicable.

Annex T
(informative)

Switch families

This annex of Part 1 is applicable.

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Annex ZA
(normative)

Normative references to international publications with their corresponding European publications

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

NOTE Where an international publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

The Annex ZB of EN 61058-1:2002 is applicable with the following addition:

Publication	Year	Title	EN/HD	Year
IEC 60227-3 (mod)	1993	Polyvinyl chloride insulated cables of rated voltages up to and including 450/750 V Part 3: Non-sheathed cables for fixed wiring	HD 21.3 S3 + A1 [1)]	1995 1999
A1	1997			

1) HD 21.3 S3:1995 and its A1:1999, which are related to, but not directly equivalent with IEC 60227-3:1993 and its A1:1997, apply.

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