

BS EN 61058-1-1:2016



BSI Standards Publication

Switches for appliances

Part 1-1: Requirements for mechanical switches

National foreword

This British Standard is the UK implementation of EN 61058-1-1:2016. It is identical to IEC 61058-1-1:2016.

The UK participation in its preparation was entrusted to Technical Committee PEL/23, Electrical accessories.

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

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

© The British Standards Institution 2016.

Published by BSI Standards Limited 2016

ISBN 978 0 580 85300 5

ICS 29.120.40

Compliance with a British Standard cannot confer immunity from legal obligations.

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 30 September 2016.

Amendments/corrigenda issued since publication

Date	Text affected
-------------	----------------------

EUROPEAN STANDARD

EN 61058-1-1

NORME EUROPÉENNE

EUROPÄISCHE NORM

September 2016

ICS 29.120.40

English Version

Switches for appliances -
Part 1-1: Requirements for mechanical switches
(IEC 61058-1-1:2016)

Interrupteurs pour appareils -
Partie 1-1: Exigences relatives aux interrupteurs mécaniques
(IEC 61058-1-1:2016)

Geräteschalter -
Teil 1-1: Anforderungen an mechanische Schalter
(IEC 61058-1-1:2016)

This European Standard was approved by CENELEC on 2016-06-29. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CENELEC member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.



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

CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

European foreword

The text of document 23J/399/FDIS, future edition 1 of IEC 61058-1-1, prepared by SC 23J "Switches for appliances", of IEC/TC 23 "Electrical accessories" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 61058-1-1:2016.

The following dates are fixed:

- latest date by which the document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2017-03-29
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2019-06-29

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CENELEC [and/or CEN] shall not be held responsible for identifying any or all such patent rights.

Endorsement notice

The text of the International Standard IEC 61058-1-1:2016 was approved by CENELEC as a European Standard without any modification.

Annex ZA (normative)

Normative references to international publications with their corresponding European publications

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

NOTE 1 When an International Publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

NOTE 2 Up-to-date information on the latest versions of the European Standards listed in this annex is available here: www.cenelec.eu.

Annex ZA of Part 1 is applicable.

CONTENTS

FOREWORD.....	3
1 Scope.....	5
2 Normative references.....	5
3 Terms and definitions	5
4 General requirements	5
5 General information on tests	5
6 Rating	7
7 Classification.....	7
8 Marking and documentation	7
9 Protection against electric shock.....	7
10 Provision for earthing.....	7
11 Terminals and terminations	7
12 Construction.....	7
13 Mechanism.....	7
14 Protection against ingress of solid foreign objects, ingress of water and humid conditions.....	7
15 Insulation resistance and dielectric strength	7
16 Heating	7
17 Endurance.....	7
17.1 General requirements.....	8
17.2 Electrical endurance tests	8
17.3 Thermal conditions	10
17.4 Actuating conditions	10
17.5 Type of test condition (TC)	12
17.6 Evaluation of compliance.....	13
17.6.1 <i>Functional compliance (TE1)</i>	13
17.6.2 <i>Thermal compliance (TE2)</i>	13
17.6.3 <i>Insulating compliance (TE3)</i>	13
18 Mechanical strength.....	13
19 Screws, current-carrying parts and connections.....	14
20 Clearances, creepage distances, solid insulation and coatings of rigid printed board assemblies	14
21 Fire hazard.....	14
22 Resistance to rusting	14
23 Abnormal operation and fault conditions for switches.....	14
24 Components for switches	14
25 EMC requirements	14
Table 101 – Test specimens	6
Table 102 – Test loads for electrical endurance tests for a.c. circuits	9
Table 103 – Test loads for electrical endurance tests for d.c. circuits	10
Table 104 – Switch operating conditions.....	11

INTERNATIONAL ELECTROTECHNICAL COMMISSION

SWITCHES FOR APPLIANCES –

Part 1-1: Requirements for mechanical switches

FOREWORD

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
- 2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
- 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
- 5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
- 8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
- 9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 61058-1-1 has been prepared by subcommittee 23J: Switches for appliances, of IEC technical committee 23: Electrical accessories.

The text of this standard is based on the following documents:

FDIS	Report on voting
23J/399/FDIS	23J/403/RVD

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

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

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

This part of IEC 61058 is to be used in conjunction with IEC 61058-1(2016).

This Part 1-1 supplements or modifies the corresponding clauses in IEC 61058-1, so as to convert that publication into the IEC standard: *Requirements for mechanical switches*.

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

In this standard:

- 1) the following print types are used:
 - requirements proper: in roman type;
 - *test specifications: in italic type*;
 - notes/explanatory matters: in small roman type.
- 2) subclauses, notes, figures and tables which are additional to those in Part 1 are numbered starting from 101. Annexes which are additional to those in Part 1 are lettered AA, BB, etc.

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

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

SWITCHES FOR APPLIANCES –

Part 1-1: Requirements for mechanical switches

1 Scope

This clause of part 1 is applicable.

Add the following at the end of Clause 1.

This part of IEC 61058 applies to mechanical switching devices and shall be used in conjunction with the requirements of IEC 61058-1.

NOTE Additional requirements for particular switches may be found in the relevant part 2 of IEC 61058.

2 Normative references

This clause of part 1 is applicable.

3 Terms and definitions

This clause of part 1 is applicable.

4 General requirements

This clause of part 1 is applicable.

5 General information on tests

This clause of part 1 is applicable with the following addition.

Add the following at the end of 5.3.

Table 101 provides information on:

- The minimum number of specimens needed for each test.
- The minimum number of total specimens, when applicable tests are added, needed for each evaluation.
- Additional specimens that may be required as a result of additional electrical rating, unique construction or damage/breakage during testing.

Table 101 – Test specimens

Clause	Description	Minimum number of specimens for each test ^{a)}			Notes
		–	i	ii	
5	General information on tests	–	i	ii	b)
6	Rating	1			c)
7	Classification				
8	Marking and documentation				
9	Protection against electric shock				
10	Provision for earthing				
11	Terminals				
12	Construction				
13	Mechanism				
14.1	Protection against ingress of solid foreign objects	1			d)
14.2	Protection against ingress of water	1			d)
14.3 to 15	Protection against humid conditions Insulation resistance and dielectric strength	3			e), m)
16	Heating	–	3	3	f), m)
17	Endurance	–	3	3	f), m)
18	Mechanical strength	1			c)
19	Screws, current-carrying parts and connections	1			c)
20	Clearance, creepage distances	1			g), h)
21	Fire hazard	2			i), c)
22	Resistance to rusting	1			c)
23	Abnormal operation and fault conditions for switches	1			l)
24	Components for switches	3			j)
25	EMC requirements	–			k)

^{a)} Additional specimens may be required depending on the construction and declaration of the switch.

^{b)} Each electrical rating submitted to the testing of Clauses 16 and 17 requires an additional 3 specimens (such as rating i = 3 specimens, rating ii = additional 3 specimens).

^{c)} The specimen may be used for more than 1 test, if cumulative stress as a result of sequential testing is avoided. When a specimen is damaged a new specimen shall be used for the next test.

^{d)} In general 1 specimen for ingress of solid foreign objects (dust), and 1 specimen for ingress of water. Specific IP ratings (such as IP 5x, IP6x and protection against water) require a special enclosure to be provided with the switch specimen in order to complete the testing.

^{e)} The same test specimens are used to complete the testing of 14.3 and 15. The tests are completed in immediate sequence.

^{f)} Heating according to Clause 16 and endurance according to Clause 17 is recommended to be tested on the same specimens. If declared, different specimens may be used when noted on the test record.

^{g)} Three additional new specimens may be required according to Clause 20, for the test according to annex G.

^{h)} For testing coatings on printed boards according to 20.4, the number of printed boards needed is determined by the testing of IEC 60664-3.

ⁱ⁾ For testing glow wire and ball pressure special test specimens according to 60695-2-11 and 60695-10-2, respectively may be required.

^{j)} The number of specimens for specific test and examination of Clause 24 is according to the individual subclasses.

^{k)} Mechanical switches in general do not require EMC testing, however in the event the mechanical switch has electronic circuitry requiring EMC, additional specimens may be required according to the EMC test program and switch construction.

^{l)} Abnormal operation and fault conditions are generally destructive, typically the switch cannot be repaired and reused for the next fault. Specially prepared specimens (such as with wires soldered to the internal circuit) may be necessary in order to complete the testing. The total number of specimens depends on the switch construction, for details see Clause 23.

^{m)} This test is part of a sequence, and a new set of 3 specimens shall not be used except as permitted by 5.1.

6 Rating

This clause of part 1 is applicable.

7 Classification

This clause of part 1 is applicable.

8 Marking and documentation

This clause of part 1 is applicable.

9 Protection against electric shock

This clause of part 1 is applicable.

10 Provision for earthing

This clause of part 1 is applicable.

11 Terminals and terminations

This clause of part 1 is applicable.

12 Construction

This clause of part 1 is applicable.

13 Mechanism

This clause of part 1 is applicable.

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

This clause of part 1 is applicable.

15 Insulation resistance and dielectric strength

This clause of part 1 is applicable.

16 Heating

This clause of part 1 is applicable.

17 Endurance

Replace the existing text by the following:

17.1 General requirements

17.1.1 Switches shall withstand without excessive wear or other harmful effect the electrical, thermal and mechanical stresses that occur in normal use.

17.1.2 *The sequence of tests to be completed on the same 3 specimens is as follows:*

- *TC3: a test at high speed specified in 17.5.3; this test only applies to switches with more than one pole, and where the type of connection is of polarity reversal;*
- *TC2: a test at slow speed specified in 17.5.2,*
- *TC1: an increased-voltage test at accelerated speed as specified in 17.5.1; this test does not apply to switches classified according to 7.2.9;*
- *TC9: a locked-rotor test as specified in 17.5.5 at accelerated speed; this test only applies to switches classified according to 7.2.9;*
- *TC4: a test at accelerated speed as specified in 17.5.4;*

followed by the requirements of 17.6.

NOTE The different types of tests are specified in 17.5.

17.1.3 *When required by Clause 13, the following test, TC10, is conducted on a different set of 3 specimens:*

- *TC10: a test at very slow speed as specified in 17.5.6; this test only applies to switches according to the requirements of 13.1.*

The manufacturer may choose to complete TC10 in the sequence of 17.1.2 in place of TC2.

Compliance is checked by 17.6.1 (TE1) and 17.6.3 (TE3).

17.2 Electrical endurance tests

The switch shall be loaded as specified in Table 102 and/or Table 103 and connected in accordance with the circuit as given in 61058-1:2016, Table 2.

- a) *Where, in IEC 61058-1:2016, Table 2, an auxiliary switch (A) is symbolized in the test circuit, the tests for the two ON-positions of the specimen (S) are performed on two separate sets of test samples. The connection to the test load to be performed for the two tests is symbolized in IEC 61058-1:2016, Table 2 by an auxiliary switch A.*
- b) *Multiway switches are loaded according to 61058-1:2016, Table 1. The load for the other switch positions is that resulting from the loads necessary to achieve the conditions specified above.*
- c) *For circuits according to 7.2.7 for specific lamp load, the connection and test load are as specified by the manufacturer using the maximum occurring inrush current at room temperature. For a specific lamp load, it is recommended that the specimen be operated with loads that are used in the field rather than with synthetic loads. Forced cooling of the specific lamp load may be applied in order to ensure cold resistance for each operating cycle and shorten the test time.*
- d) *No electrical load is applied during the endurance tests for switches classified to 7.2.6 with a rating of 20 mA or less.*

Table 102 – Test loads for electrical endurance tests for a.c. circuits

Type of circuit as classified in 7.2	OPERATION of contacts	Test voltage	Test current r.m.s.	Power factor ^{c)}
Substantially resistive (classified in 7.2.1)	Making and breaking	Rated voltage	$I-R$	$\geq 0,9$
General Purpose (classified in 7.2.10)	Making and breaking	Rated voltage	$I-GP$	$\geq 0,75$ (+0,05)
Resistive and/or motor (classified in 7.2.2)	Making ^{b)}	Rated voltage	$6 \times I-M$ or	0,60 (+0,05)
			$I-R^{a)}$	$\geq 0,9$
	Breaking	Rated voltage	$I-R$ or	$\geq 0,9$
			$I-M^{a)}$	$\geq 0,9$
Circuit for specific load of motor with a locked rotor and with a power factor not less than 0,6 (classified in 7.2.9)	Making	Rated voltage	$6 \times I-M$	0,60 (+0,05)
	Breaking	Rated voltage	$6 \times I-M$	0,60 (+0,05)
Circuit for an inductive load (classified in 7.2.8)	Making ²⁾	Rated voltage	$6 \times I-I$	0,60 (+0,05)
	Breaking	Rated voltage	$I-I$	0,60 (+0,05)
Resistive and capacitive (classified in 7.2.3)	Making and breaking	Tested in a circuit as shown in Figure 8		
Tungsten filament lamp load (classified in 7.2.4)	Making and breaking	Tested in a circuit as shown in Figure 8 ^{d)}		
		Rated voltage ≥ 110 V a.c., $X = 16$		
		Rated voltage < 110 V a.c., $X = 10$		
Circuit for specific lamp load (classified in 7.2.7)	Making and breaking	Rated voltage	As determined by load	
Specified declared (classified in 7.2.5)	Making and breaking	Rated voltage	As determined by load	
<p>$I-I$: inductive-load current</p> <p>$I-M$: motor-load current</p> <p>$I-R$: resistive-load current</p> <p>a) Whichever is arithmetically greater or the most unfavourable value in case of equal values.</p> <p>b) The specified making conditions are maintained for a period between 50 ms and 100 ms, and are then reduced by an auxiliary switch to the specified breaking conditions.</p> <p>For mechanical switches the test current may be reduced to $I-R$ by introducing a resistor in the circuit. Short interruptions of the test current during the reduction to $I-R$ not exceeding a period of 50 ms to 100 ms are permitted.</p> <p>A typical method of achieving this is shown in Figure 16.</p> <p>c) Resistors and inductors are not connected in parallel except that if any air-core inductor is used, a resistor taking approximately 1 % of the current through the inductor is connected in parallel with it. Iron-core inductors may be used provided that the current has a substantial sine-wave form. For three-phase tests, three-core inductors are used.</p> <p>d) In the case where the tests are performed with tungsten filament lamp bulbs, the following test conditions apply:</p> <ul style="list-style-type: none"> – the ratio $X = 16$ or $X = 10$ shall be achieved; – the cold resistance of the lamps shall be ensured for each operating cycle; – the resistance of connections within the load circuit (for example lamp sockets) shall be constant; – the proper function of the lamps performing the load set shall be ensured for each operating cycle. 				

Table 103 – Test loads for electrical endurance tests for d.c. circuits

Type of circuit as classified in 7.2	Operation of contacts	Test voltage	Test current	Time constant
Substantially resistive load	Making and breaking	Rated voltage	$I \cdot R$	$L/R < 1,15 \text{ ms}$
Tungsten filament lamp load (classified in 7.2.4)	Making and breaking	Rated voltage	Tested in a circuit as shown in Figure 9	
			Rated voltage $\geq 110 \text{ V d.c.}$, $X = 6$	
			Rated voltage $< 110 \text{ V d.c.}$, $X = 10$ a)	
Resistive and capacitive load (classified in 7.2.3)	Making and breaking	Tested in a circuit as shown in Figure 9b		
Circuit for specific lamp load (classified in 7.2.7)	Making and breaking	Rated voltage	As determined by load	
Declared specific load (classified in 7.2.5)	Making and breaking	Rated voltage	As determined by load	
$I \cdot R$: resistive load current				
^{a)} In case where the tests are performed with tungsten filament lamp bulbs, the following test conditions apply: <ul style="list-style-type: none"> – the ratio $X = 16$ or $X = 10$ shall be achieved; – the cold resistance of the lamps shall be ensured for each operating cycle; – the resistance of connections within the load circuit (for example lamp sockets) shall be constant; – the proper function of the lamps performing the load set shall be ensured for each operating cycle. 				

17.3 Thermal conditions

17.3.1 For switches according to 7.3.2, during the tests in 17.5.4 (TC4) all parts are exposed to temperatures as follows:

- For the first half of the test period at maximum air temperature ($T + 5/0$) °C.
- For the second half of the test period at $25 \text{ °C} \pm 10 \text{ °C}$ or at the minimum air temperature ($T 0/-5$) °C if T is less than 0 °C .

17.3.2 For switches according to 7.3.3, during the tests in 17.5.4 (TC4), those parts that are declared for use at 0 °C to 55 °C shall be exposed to a temperature within this range for the complete test period.

- For the first half of the test period, the air temperature of the remainder of the switch shall, be maintained at the maximum air temperature ($T + 5/0$) °C.
- For the second half of the test period the tests are carried out at $25 \text{ °C} \pm 10 \text{ °C}$ or at the minimum air temperature ($T 0/-5$) °C if T is less than 0 °C .

17.3.3 For switches according to 7.3.1, during the tests in 17.5.4 (TC4), the switch shall be exposed to an air temperature of $25 \text{ °C} \pm 10 \text{ °C}$.

17.4 Actuating conditions

17.4.1 The switches are operated by means of their actuating member either manually or by an appropriate apparatus which is arranged to simulate normal actuation.

The operating speed for the operating cycles shall be as follows:

For the tests of mechanical switches:

- a) *for very slow speed:*
- *approximately $1^\circ/\text{s}$ for rotary actuation;*
 - *approximately $0,5 \text{ mm/s}$ for linear actuation.*

b) *for slow speed:*

- *approximately 9°/s for rotary actuations at an angle of operation $\leq 45^\circ$;*
- *approximately 18°/s for rotary actuations at an angle of operation $>45^\circ$;*
- *approximately 20 mm/s to 25 mm/s for linear actuations.*

c) *for high speed, the actuation member shall be actuated by hand as fast as possible or using the accelerated speed.*

d) *for accelerated speed:*

- *approximately 45°/s for rotary actuations at an angle of operation $\leq 45^\circ$;*
- *approximately 90°/s for rotary actuations at an angle of operation $>45^\circ$;*
- *approximately 80 mm/s for linear actuations.*

17.4.2 For biased switches, the actuating member shall be moved to the limit of travel of the opposite position.

17.4.3 *During the testing, care is taken that the test apparatus drives the actuating member, without impeding the designed movements of the switch.*

17.4.4 *During the accelerated speed test*

- a) *care shall be taken to ensure that the test apparatus allows the actuating member to operate freely, so that there is no interference with the normal action of the mechanism;*
- b) *for switches designed for a rotary actuation where the movement is not limited in either direction, three-quarters of the total number of operating cycles in each test shall be made in a clockwise direction, and one-quarter in an anti-clockwise direction;*
- c) *for switches which are designed for rotary actuation in one direction only, the test shall be performed in the designed direction, provided that it is not possible to rotate the actuating member in the reverse direction using the torques necessary for actuation in the designed direction;*
- d) *additional lubrication shall not be applied during these tests;*
- e) *the forces applied to the end stops of the actuating members shall not exceed the declared values (if any) for rotary and linear actuation. The declared full travel of the actuating member (if any) shall be applied during these tests.*

17.4.5 So far as the design allows, switches are operated with the following conditions:

Table 104 – Switch operating conditions

Load type	ON (s)	OFF (s)	Comments
Up to 10 A	1	3	Approximately 15 operating cycles per minute.
>10 up to 25 A	2	6	Approximately 7,5 operating cycles per minute.
>25 up to 63 A	4	12	Approximately 3,75 operating cycles per minute.
Capacitive and simulated lamp load	2	15	To allow for the discharge of the capacitive load. See IEC 61058-1:2016, Figures 8 and 9
Tungsten lamp loads	Minimum 1	Minimum 55	55 s to allow for cooling of the tungsten lamps for inrush current; in case of more than one load sets the minimum cooling time for each load set shall be 55 s and the cycle rate for the switch may be increased.
Required very slow speed TC10	Minimum 2	Minimum 6	To allow arcing at the make and break.
Locked rotor tests (TC9)	1	30	To allow for the inrush.

For switches with more than one load (throw), each operating in the test circuit such as Table 2 test codes 2.3, 2.5, 2.7 or 2.9, the ON periods will be approximately 50 %.

Multi-way switches may comply with the table above, or be actuated with the speed indicated in 17.4.1 and a minimum ON period of 25 %.

This requirement in Table 104 is not valid for very slow speed (TC10), the on time shall be sufficient to allow arcing.

17.5 Type of test condition (TC)

17.5.1 Increased-voltage test at accelerated speed (TC1):

- *Electrical conditions: The load specified according to Table 102, the voltage increased to 1,15 the rated voltage (the load is not readjusted).*
- *Capacitive load and simulated lamp load tests for a.c. circuits, the test voltage is the rated voltage and the test currents are increased to 1,15 rated currents.*
- *Thermal conditions: 25 °C ± 10 °C*
Actuating speed: accelerated speed in 17.4.
- *Operating cycles: 100.*

17.5.2 Test at slow speed (TC2):

- *Electrical conditions: Specified in 17.2.*
- *Thermal conditions: 25 °C ± 10 °C.*
- *Actuating speed: Slow speed in 17.4.*
- *Operating cycles: 100.*

17.5.3 Test at high speed (TC3):

- *Electrical conditions: Specified in 17.2.*
- *Thermal conditions: 25 °C ± 10 °C.*
- *Actuating speed: High speed in 17.4.*
- *Operating cycles: 100.*

This test applies only to switches which have more than one pole and when polarity reversal occurs (when it is possible to move from one polarity to the opposite without a mechanical interlock or similar mechanical impediment).

17.5.4 Test at accelerated speed (TC4):

- *Electrical conditions: specified in 17.2.*
- *Thermal conditions: specified in 17.3.*
- *Actuating speed: accelerated speed in 17.4.*
- *Operating cycles: Total number declared (7.4) less the number already made during tests of 17.5.1, 17.5.2 and 17.5.3.*

17.5.5 Locked-rotor test (TC9):

- *Electrical conditions: specified in 17.2.*
- *Thermal conditions: 25 °C ± 10 °C.*
- *Actuating speed: Accelerated speed in 17.4.*
- *Operating cycles: 50.*

For switches according to 7.2.2, the test load condition for making operation for resistive and/or motor load with a rated current of $6 \times I-M$ and with a power factor of 0,6 is used for the making and breaking operation.

17.5.6 Test at very slow speed (TC10):

- *Electrical conditions: specified in 17.2.*
- *Thermal conditions: $25\text{ °C} \pm 10\text{ °C}$.*
- *Actuating speed: very slow speed in 17.4.*
- *Operating cycles:100.*

TC10 when required by Clause 13, is completed on a separate set of 3 specimens and is not part of the Table 101 sequence. Compliance is checked by 17.6.1 (TE1) and 17.6.2 (TE2).

17.6 Evaluation of compliance

17.6.1 Functional compliance (TE1)

After all the appropriate tests of 17.5, the switch is inspected for functionality. Compliance is checked by the following:

- *all actions function as declared;*
- *no loosening of electrical or mechanical connections occur;*
- *sealing compound shall not flow to such an extent that LIVE PARTS are exposed.*

17.6.2 Thermal compliance (TE2)

After all the appropriate tests of 17.5, the switch is tested in accordance with Clause 16 in IEC 61058-1:2016 as modified by the following:

- *16.4.d) to 16.4.e) are not applicable*
- *16.4.f): all switches are tested in an ambient of $25\text{ °C} \pm 10\text{ °C}$.*
- *16.4.g) to 16.4.i) are not applicable*
- *16.4.q): terminals are measured as close as possible to the body of the switch. If the thermocouples cannot be positioned directly on the terminals the thermocouples may be fixed on the conductors (with the insulation removed) as close as possible to the body of the switch.*

Compliance is checked if the temperature rise at the terminals does not exceed 55 K.

17.6.3 Insulating compliance (TE3)

After all the appropriate tests of 17.5, the switch is tested as follows:

- *the dielectric strength test of 15.3 in IEC 61058-1:2016 applies with the exception that the specimens are not subjected to the humidity treatment before the application of the test voltage. The test voltage shall be 75 % of the corresponding test voltage specified in that subclause.*

Compliance is checked by evidence that no transient fault between live parts and earth metal, accessible metal parts, or actuating members has occurred.

18 Mechanical strength

This clause of part 1 is applicable.

19 Screws, current-carrying parts and connections

This clause of part 1 is applicable.

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

This clause of part 1 is applicable.

21 Fire hazard

This clause of part 1 is applicable.

22 Resistance to rusting

This clause of part 1 is applicable.

23 Abnormal operation and fault conditions for switches

Replace the existing text by the following:

Mechanical switches with electronic components are checked by the requirements of Clause 23 of IEC 61058-1-2:2016.

Switches with rigid printed boards with creepage distances and clearances that do not comply with the required distances of Table 12 to Table 14 of IEC 61058-1:2016, are checked by the requirements of Clause 23 of IEC 61058-1-2:2016.

24 Components for switches

This clause of part 1 is applicable.

25 EMC requirements

This clause of part 1 is applicable.

British Standards Institution (BSI)

BSI is the national body responsible for preparing British Standards and other standards-related publications, information and services.

BSI is incorporated by Royal Charter. British Standards and other standardization products are published by BSI Standards Limited.

About us

We bring together business, industry, government, consumers, innovators and others to shape their combined experience and expertise into standards-based solutions.

The knowledge embodied in our standards has been carefully assembled in a dependable format and refined through our open consultation process. Organizations of all sizes and across all sectors choose standards to help them achieve their goals.

Information on standards

We can provide you with the knowledge that your organization needs to succeed. Find out more about British Standards by visiting our website at bsigroup.com/standards or contacting our Customer Services team or Knowledge Centre.

Buying standards

You can buy and download PDF versions of BSI publications, including British and adopted European and international standards, through our website at bsigroup.com/shop, where hard copies can also be purchased.

If you need international and foreign standards from other Standards Development Organizations, hard copies can be ordered from our Customer Services team.

Copyright in BSI publications

All the content in BSI publications, including British Standards, is the property of and copyrighted by BSI or some person or entity that owns copyright in the information used (such as the international standardization bodies) and has formally licensed such information to BSI for commercial publication and use.

Save for the provisions below, you may not transfer, share or disseminate any portion of the standard to any other person. You may not adapt, distribute, commercially exploit, or publicly display the standard or any portion thereof in any manner whatsoever without BSI's prior written consent.

Storing and using standards

Standards purchased in soft copy format:

- A British Standard purchased in soft copy format is licensed to a sole named user for personal or internal company use only.
- The standard may be stored on more than 1 device provided that it is accessible by the sole named user only and that only 1 copy is accessed at any one time.
- A single paper copy may be printed for personal or internal company use only.

Standards purchased in hard copy format:

- A British Standard purchased in hard copy format is for personal or internal company use only.
- It may not be further reproduced – in any format – to create an additional copy. This includes scanning of the document.

If you need more than 1 copy of the document, or if you wish to share the document on an internal network, you can save money by choosing a subscription product (see 'Subscriptions').

Reproducing extracts

For permission to reproduce content from BSI publications contact the BSI Copyright & Licensing team.

Subscriptions

Our range of subscription services are designed to make using standards easier for you. For further information on our subscription products go to bsigroup.com/subscriptions.

With **British Standards Online (BSOL)** you'll have instant access to over 55,000 British and adopted European and international standards from your desktop. It's available 24/7 and is refreshed daily so you'll always be up to date.

You can keep in touch with standards developments and receive substantial discounts on the purchase price of standards, both in single copy and subscription format, by becoming a **BSI Subscribing Member**.

PLUS is an updating service exclusive to BSI Subscribing Members. You will automatically receive the latest hard copy of your standards when they're revised or replaced.

To find out more about becoming a BSI Subscribing Member and the benefits of membership, please visit bsigroup.com/shop.

With a **Multi-User Network Licence (MUNL)** you are able to host standards publications on your intranet. Licences can cover as few or as many users as you wish. With updates supplied as soon as they're available, you can be sure your documentation is current. For further information, email subscriptions@bsigroup.com.

Revisions

Our British Standards and other publications are updated by amendment or revision.

We continually improve the quality of our products and services to benefit your business. If you find an inaccuracy or ambiguity within a British Standard or other BSI publication please inform the Knowledge Centre.

Useful Contacts

Customer Services

Tel: +44 345 086 9001

Email (orders): orders@bsigroup.com

Email (enquiries): cservices@bsigroup.com

Subscriptions

Tel: +44 345 086 9001

Email: subscriptions@bsigroup.com

Knowledge Centre

Tel: +44 20 8996 7004

Email: knowledgecentre@bsigroup.com

Copyright & Licensing

Tel: +44 20 8996 7070

Email: copyright@bsigroup.com

BSI Group Headquarters

389 Chiswick High Road London W4 4AL UK