IEC 61058-1-2

Edition 1.0 2016-05

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Switches for appliances –
Part 1-2: Requirements for electronic switches

Interrupteurs pour appareils –
Partie 1-2: Exigences relatives aux interrupteurs électroniques

IEC 61058-1-2:2016-05(en-fr)

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

COMMISSION ELECTROTECHNIQUE INTERNATIONALE

ICS 29.120.40

ISBN 978-2-8322-3397-9

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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SWITCHES FOR APPLIANCES –

Part 1-2: Requirements for electronic switches

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International Standard IEC 61058-1-2 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/400/FDIS	23J/404/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 1-2 supplements or modifies the corresponding clauses in IEC 61058-1, so as to convert that publication into the IEC standard: *Requirements for electronic switches*.

When a particular subclause of Part 1 is not mentioned in this Part 1-2, 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 website 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 1-2: Requirements for electronic 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 electronic switching devices and shall be used in conjunction with the general 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
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	1			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 IP5x, 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 test are completed in immediate sequence.

f) Heating and endurance is recommended to be tested on the same specimens. If declared, separate 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) EMC testing may require additional specimens 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 5.1.2.

6 Rating

This clause of part 1 is applicable.

7 Classification

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

Add the following at the end of Clause 7.

7.24 Operating cycles with mechanical switching device only (TC7)

7.25 Endurance method

7.25.1 Electrical endurance method “a” (Table 103)

7.25.2 Electrical endurance method “b” (Table 103)

7.26 Minimum load for electronic switches

7.27 According to test conditions for electronic switches:

7.27.1 Functional test conditions for electronic switches with thermal current or maximum rated resistive current.

NOTE This test condition reflects the proper functioning of the switch. This test does not simulate the actual load of the end application.

7.27.2 Simulated test conditions for electronic switches with type of load as classified in 7.2.

NOTE This test condition reflects the proper functioning of the switch. It also simulates all conditions of the end application.

7.27.3 Specific test conditions of end application for electronic switches, i.e. in or together with the appliance and under the cooling conditions of the appliance.

8 Marking and documentation

This clause of part 1 is applicable with exceptions as below.

Table 3 is applicable with the following addition.

Table 102 – Switch information and the loads placed in groups

No	Characteristic	Subclause	Means of information	
			Common type reference CT	Unique type reference UT
12.3	Thermal current if defined	3.2.12	Documentation	Documentation
12.4	Number of cycles with electronic control failed (TC 7)	7.24	Documentation	Documentation
12.5	Endurance method “a” or “b”	7.25	Documentation	Documentation
12.6	Minimum test load if required	7.26	Documentation	Documentation
12.7	Test conditions functional or simulated	7.27	Documentation	Documentation
12.8	Cooling conditions	7.22	Documentation	Documentation

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 with the following addition.

Add the following 11.5:

Compliance is checked according to TE2 in Clause 17. For electronic switches rated for less than 1E4 cycles the TE2 test shall be performed on the complete switch.

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 with the following addition.

Add the following to 15.1:

– *For electronic switches, the test is carried out across full disconnection and micro-disconnection only on electronic switches with mechanical switching devices connected in series with the semiconductor switching device.*
– *For electronic switches, the tests are not carried out across protective impedances and poles interconnected by components.*

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.

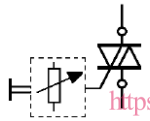
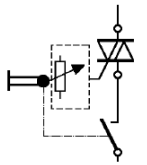
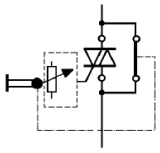
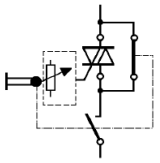
17.1.2 Electronic switches are tested in an increasing TC order as specified in Table 103.

The test conditions are according to the following depending on their classification in 7.27.

- *under functional test conditions according to 7.27.1 with thermal current or with maximum rated resistive current, if no thermal current is declared, and without forced cooling;*
- *under simulated test conditions according to 7.27.2 and with type of load according to 7.2 and under the cooling conditions classified in 7.22 and with test conditions as specified in Tables 104 and 105;*
- *under specific test conditions of end application according to 7.27.3, in or together with the appliance and under the cooling conditions of the appliance;*
- *under test conditions according to duty type according to 7.18, the tests may be performed in combination with simulated test conditions or specific test conditions of the end application.*

NOTE Additional mechanical operating means (for example, actuating member such as speed-limit settings for electric tools) are ignored.

Table 103 – Electrical endurance tests for electronic switches

Type of electronic switch3)		Test conditions					
		Functional test (7.27.1)		Simulated test (7.27.2) (Tables 104 and 105)		Specific test condition of end application (7.27.3)	
		Complete switch	Contacts only	Complete switch	Contacts only	Complete switch	Contacts only
SD [1] **without electrical contact(s)**		TL1 TC5, TC6, TC8 TE1, TE3	---	TL3 TC5, TC6, TC8 TE1, TE3	---	TL4 TC5, TC6, TC8 TE1, TE3	---
SD with serial contact(s)		TL1 TC5, TC6, TC8 TE1, TE3	Serial contact: TC1, TC4 with TL2 TE1 to TE3 (SD short-circuited) [2]	a) TL1 TC5, TC6, TC8 TE1, TE3	a) Serial contact: TL3, TC1, TC4 TE1 to TE3 (SD short-circuited) [2]	TL4 TC5, TC8 TE1, TE3	Serial contact: TC7 with TL4 TE1 to TE3 (SD short-circuited) [2]
				b) TL3 TC5, TC6, TC8 TE1, TE3	b) Serial contact: TL3, TC1, TC7 TE1 to TE3 (SD short-circuited) [2]		
SD with parallel contact(s)		TL1 TC5, TC6, TC8 TE1, TE3	Parallel contact: TC1, TC4 with TL2 TE1 to TE3 (SD disconnected)	TL3 TC5, TC6, TC8 TE1, TE3	Parallel contact: TL3, TC1, TC4 TE1 to TE3 (SD disconnected)	TL4 TC5, TC8 TE1, TE3	Parallel contact: TC7 with TL4 TE1 to TE3 (SD disconnected)
SD with serial and parallel contact(s)		TL1 TC5, TC6, TC8 TE1, TE3	Serial contact: TC1, TC4 with TL2 TE1 to TE3 (SD short-circuited) [2]	a) TL1 TC5, TC6, TC8 TE1, TE3	a) Serial contact: TL3, TC1, TC4 TE1 to TE3 (SD short-circuited) [2]	TL4 TC5, TC8 TE1, TE3	Serial contact: TC7 with TL4 TE1 to TE3 (SD short-circuited) [2]
				b) TL3 TC5, TC6, TC8 TE1, TE3	b) Serial contact: TL3, TC1, TC7 TE1 to TE3 (SD short-circuited) [2]		
			Parallel contact: TC1, TC4 with TL2 TE1 to TE3 (SD disconnected)		a) and b) Parallel contact: TL3, TC1, TC7 TE1 to TE3 (SD disconnected)		Parallel contact: TC7 with TL4 TE1 to TE3 (SD disconnected)