UL 61058-2-6

STANDARD FOR SAFETY

Switches for Appliances – Part 2-6: Particular Requirements for Switches Used In Electric Motor-Operated Hand-Held Tools, Transportable Tools and Lawn and Garden Machinery

UL Standard for Safety for Switches for Appliances – Part 2-6: Particular Requirements for Switches Used In Electric Motor-Operated Hand-Held Tools, Transportable Tools and Lawn and Garden Machinery, UL 61058-2-6

First Edition, Dated March 31, 2020

Summary of Topics

The First Edition of the Standard for Switches for appliances – Part 2-6: Particular requirements for switches used in electric motor-operated hand-held tools, transportable tools and lawn and garden machinery, UL 61058-2-6 has been published and reflects the latest approval date as an American National Standard and is harmonized with the Second Edition of the Switches for appliances – Part 2-6: Particular requirements for switches used in electric motor-operated hand-held tools, transportable tools and lawn and garden machinery, IEC 61058-2-6.

The requirements are substantially in accordance with Proposal(s) on this subject dated June 22, 2019.

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First Edition
(IEC 61058-2-6:2018, MOD)

Underwriters Laboratories Inc.
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First Edition

Switches for Appliances – Part 2-6: Particular Requirements for Switches Used In Electric Motor-Operated Hand-Held Tools, Transportable Tools and Lawn and Garden Machinery

March 31, 2020

This national standard is based on publication IEC 61058-2-6, Second Edition (2018).

ANSI/UL 61058-2-6-2020

Commitment for Amendments

This standard is issued jointly by the Canadian Standards Association (operating as “CSA Group”) and Underwriters Laboratories Inc. (UL). Comments or proposals for revisions on any part of the standard may be submitted to CSA Group or UL at anytime. Revisions to this standard will be made only after processing according to the standards development procedures of CSA Group and UL. CSA Group and UL will issue revisions to this standard by means of a new edition or revised or additional pages bearing their date of issue.

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This Standard is subject to review within five years from the date of publication, and suggestions for its improvement will be referred to the appropriate committee. The technical content of IEC and ISO publications is kept under constant review by IEC and ISO. To submit a proposal for change, please send the following information to inquiries@csagroup. org and include "Proposal for change" in the subject line: Standard designation (number); relevant clause, table, and/or figure number; wording of the proposed change; and rationale for the change.

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This ANSI/UL Standard for Safety consists of the First Edition.

The most recent designation of ANSI/UL 61058-2-6 as an American National Standard (ANSI) occurred on March 31, 2020. ANSI approval for a standard does not include the Cover Page, Transmittal Pages, Title Page (front and back), or the Preface. The National Difference Page and IEC Foreword are also excluded from the ANSI approval of IEC-based standards.

Comments or proposals for revisions on any part of the Standard may be submitted to UL at any time. Proposals should be submitted via a Proposal Request in UL's On-Line Collaborative Standards Development System (CSDS) at https://csds.ul.com.

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PREFACE

This is the harmonized CSA Group and UL standard for Switches for Appliances – Part 2-6: Particular Requirements for Switches Used In Electric Motor-Operated Hand-Held Tools, Transportable Tools and Lawn and Garden Machinery. It is the first edition of CSA C22.2 No. 61058-2-6, and the first edition of UL 61058-2-6.

This harmonized standard is based on IEC Publication 61058-2-6: second edition Switches for appliances – Part 2-6: Particular requirements for switches used in electric motor-operated hand-held tools, transportable tools and lawn and garden machinery, issued November 2018. IEC 61058-2-6 is copyrighted by the IEC.

This harmonized standard was prepared by CSA Group and Underwriters Laboratories Inc. (UL). The efforts and support of the International Harmonization Committee on Switches for Appliances are gratefully acknowledged.

This standard is considered suitable for use for conformity assessment within the stated scope of the standard.

This standard was reviewed by the CSA Integrated Committee on Wiring Devices, under the jurisdiction of the CSA Technical Committee on Wiring Products and the CSA Strategic Steering Committee on Requirements for Electrical Safety, and has been formally approved by the CSA Technical Committee. This standard has been developed in compliance with Standards Council of Canada requirements for National Standards of Canada. It has been published as a National Standard of Canada by CSA Group.

Application of Standard

Where reference is made to a specific number of samples to be tested, the specified number is to be considered a minimum quantity.

Note: Although the intended primary application of this standard is stated in its scope, it is important to note that it remains the responsibility of the users of the standard to judge its suitability for their particular purpose.

CSA C22.2 No. 61058-2-6 is to be used in conjunction with the third edition of CAN/CSA-C22.2 No. 61058-1. The requirements for switches used in electric motor-operated hand-held tools, transportable tools, and lawn and garden machinery are contained in this Part 2 Standard and CAN/CSA-C22.2 No. 61058-1. Requirements of this Part 2 Standard, where stated, amend the requirements of CAN/CSA-C22.2 No. 61058-1. Where a particular subclause of CAN/CSA-C22.2 No. 61058-1 is not mentioned in CSA C22.2 No. 61058-2-6, the CAN/CSA-C22.2 No. 61058-1 subclause applies.

UL Standard 61058-2-6 is to be used in conjunction with the fifth edition of UL 61058-1. The requirements for switches used in electric motor-operated hand-held tools, transportable tools, and lawn and garden machinery are contained in this Part 2 Standard and UL 61058-1. Requirements of this Part 2 Standard, where stated, amend the requirements of UL 61058-1. Where a particular subclause of UL 61058-1 is not mentioned in UL 61058-2-6, the UL 61058-1 subclause applies.

Level of Harmonization

This standard adopts the IEC text with national differences.

This standard is published as an identical standard for CSA Group and UL.

An identical standard is a standard that is exactly the same in technical content except for national differences resulting from conflicts in codes and governmental regulations. Presentation is word for word except for editorial changes.

All national differences from the IEC text are included in the CSA Group and UL versions of the standard. While the technical content is the same in each organization's version, the format and presentation may differ.

Reasons for Differences From IEC

Differences from the IEC are being added in order to address safety and regulatory situations present in the US and Canada.

Interpretations

The interpretation by the standards development organization of an identical or equivalent standard is based on the literal text to determine compliance with the standard in accordance with the procedural rules of the standards development organization. If more than one interpretation of the literal text has been identified, a revision is to be proposed as soon as possible to each of the standards development organizations to more accurately reflect the intent.

IEC Copyright

For CSA Group, the text, figures, and tables of International Electrotechnical Commission Publication 61058-2-6 Switches for appliances – Part 2-6: Particular requirements for switches used in electric motor-operated hand-held tools, transportable tools and lawn and garden machinery, copyright 2018, are used in this standard with the consent of the International Electrotechnical Commission. The IEC Foreword is not a part of the requirements of this standard but is included for information purposes only.

NATIONAL DIFFERENCES

In the CSA Group and UL publications of this standard, National Differences from the text of International Electrotechnical Commission (IEC) Publication 61058-2-6, Standard for Switches for appliances – Part 2-6: Particular requirements for switches used in electric motor-operated hand-held tools, transportable tools and lawn and garden machinery, copyright 2018, are indicated by notations (differences) and are presented in bold text. The national difference type is included in the body.

There are five types of National Differences as noted below. The difference type is noted on the first line of the National Difference in the standard. The standard may not include all types of these National Differences.

DR – These are National Differences based on the **national regulatory requirements**.

D1 – These are National Differences which are based on **basic safety principles and requirements**, elimination of which would compromise safety for consumers and users of products.

D2 – These are National Differences from IEC requirements based on existing **safety practices**. These requirements reflect national safety practices, where empirical substantiation (for the IEC or national requirement) is not available or the text has not been included in the IEC standard.

DC – These are National Differences based on the **component standards** and will not be deleted until a particular component standard is harmonized with the IEC component standard.

DE – These are National Differences based on **editorial comments or corrections**.

Each national difference contains a description of what the national difference entails. Typically one of the following words is used to explain how the text of the national difference is to be applied to the base IEC text:

Addition / Add - An addition entails adding a complete new numbered clause, subclause, table, figure, or annex. Addition is not meant to include adding select words to the base IEC text.

Modification / Modify - A modification is an altering of the existing base IEC text such as the addition, replacement or deletion of certain words or the replacement of an entire clause, subclause, table, figure, or annex of the base IEC text.

Deletion / Delete - A deletion entails complete deletion of an entire numbered clause, subclause, table, figure, or annex without any replacement text.

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FOREWORD

INTERNATIONAL ELECTROTECHNICAL COMMISSION

SWITCHES FOR APPLIANCES – Part 2-6: Particular requirements for switches used in electric motor-operated hand-held tools, transportable tools and lawn and garden machinery

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.

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6) All users should ensure that they have the latest edition of this publication.

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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 61058-2-6 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 2016. It constitutes a technical revision.

This edition includes the following significant change with respect to the previous edition:

Overall format to support IEC 61058-1, IEC 61058-1-1 and IEC 61058-1-2.

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

FDIS	Report on voting
3J/450/FDIS	23J/452/RVD

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 switches used in electric motor-operated hand-held tools, transportable tools and lawn and garden machinery*.

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 standard:

1) the following print types are used:

- requirements proper: in roman type;
- test specifications: *in italic type*;
- notes/explanatory matter: in small roman type.

2) subclauses, notes, figures and 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.

101DV D2 *Addition of the following:*

This nationally adopted Part 2-6 standard shall be used in conjunction with the nationally adopted IEC 61058-1 Part 1 standard, the nationally adopted IEC 61058-1-1 Part 1-1 standard, and any relevant nationally adopted IEC 61058-2-x Part 2 standards. For references to IEC 61058, IEC 61058-1, or IEC 61058-1-1, replace the reference with

CAN/CSA-C22.2 No. 61058/UL 61058, CAN/CSA-C22.2 No. 61058-1/UL 61058-1, or CAN/CSA-C22.2 No. 61058-1-1/UL 61058-1-1 accordingly.

102DV DE *Addition of the following:*

The numbering system in the standard uses a space instead of a comma to indicate thousands and uses a comma instead of a period to indicate a decimal point. For example, 1 000 means 1,000 and 1,01 means 1.01.

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Switches for appliances – Part 2-6: Particular requirements for switches used in electric motor-operated hand-held tools, transportable tools and lawn and garden machinery

1 Scope

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

Addition:

This part of IEC 61058 is a subset based on IEC 61058-1. The clauses outlined below are intended to address the specific requirements for switches incorporated into or integrated with electric motor-operated hand-held tools, transportable tools and lawn and garden machinery.

This document is intended for switches with an ambient temperature up to and including 55 °C. Switches tested according to IEC 61058-1 are considered to comply with this document and additional testing is not required provided ratings, loads, and endurance are correct.

NOTE This document takes into account the fact that tests are conducted as part of the end-product evaluation (e.g. products tested according to the IEC 60745 and IEC 62841 series, and lawn and gardening equipment tested according to the IEC 60335 series), and that tests are not conducted on the component switch.

2 Normative References

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

Addition:

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

3 Terms and definitions

Clause 3 of IEC 61058-1:2016 is applicable.

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.

7.3.2 IEC 61058-1:2016, 7.3.2 is not applicable.

7.3.3 IEC 61058-1:2016, 7.3.3 is not applicable.

7.7.1 IEC 61058-1:2016, 7.7.1 is not applicable.

7.7.2 IEC 61058-1:2016, 7.7.2 is not applicable.

8 Marking and documentation

Clause 8 of IEC 61058-1:2016 is applicable except as follows.

8.1.1 General

Addition:

Switches declared for use in appliances such as power tools are considered unique type (UT) when referencing Table 3.

8.1.3 By documentation

Replacement of Table 3:

Table 3
Switch information

Characteristic	Means of information
SWITCH IDENTIFICATION –	UNIQUE TYPE REFERENCE UT (7.10.1)
Manufacturer's name or trade mark	Marking
Type reference (model or catalogue number)	Marking
Identification that the switch is in compliance with this document (8.101)	Marking
Type of appliance for which a switch shall be used (hand-held tools, transportable tools, or lawn and garden machinery)	Documentation
Number of operating cycles (7.4)	Documentation
Degree of protection against electric shock, from outside an appliance (7.7)	Documentation
Number of cycles with switching device only (TC 7) (17.5.7)	Documentation
All terminals shall be suitably identified, or their purpose self-evident, or the switch circuitry visually apparent. For terminals intended for the connection of supply conductors, the identification may take the form of a letter L, a number or an arrow	Marking
The rated current and electrical load type	Documentation
Ambient temperature limits if different from 0 °C to 55 °C	Documentation
Duty-type and relevant information (e.g. ON/OFF-time) (7.18)	Documentation

8.3 Load rating

IEC 61058-1:2016, 8.3 is applicable except as follows.

8.3.2 Substantially restive load

IEC 61058-1:2016, 8.3.2 is not applicable.

8.3.4 Resistive load and capacitive load

IEC 61058-1:2016, 8.3.4 is not applicable.

8.3.5 Resistive load and tungsten filament lamp load

IEC 61058-1:2016, 8.3.5 is not applicable.

8.3.6 Declared specific load

IEC 61058-1:2016, 8.3.6 is not applicable.

8.3.8 General purpose loads

IEC 61058-1:2016, 8.3.8 is not applicable.

Addition:

8.101 Switch compliance with IEC 61058-2-6

The marking to indicate compliance with IEC 61058-2-6 shall be "PT".

Compliance is checked by inspection.

9 Protection against electric shock

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

9.1 IEC 61058-1:2016, 9.1 is not applicable.

NOTE The requirements of this subclause are covered in the end-product standard.

10 Provision for earthing

Clause 10 of IEC 61058-1:2016 is not 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.

NOTE The requirements of this clause are covered in the end-product standard.

13 Mechanism

Clause 13 of IEC 61058-1:2016 is not applicable.

NOTE The requirements of this clause are covered in the end-product standard.

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

Replacement of the second paragraph:

Compliance is checked by the humidity treatment described in IEC 61058-1:2016, 14.3, followed by the test of 15.1. Cable inlet openings, if any, and drain-holes are left open. If a drain-hole is provided for a water-tight switch, it is opened.

15 Insulation resistance and dielectric strength

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

15.1 General requirements

Replacement:

The dielectric strength of switches shall be adequate.

Compliance is checked by the test of 15.3, the test being made immediately after the test of 14.3.

The test voltage according to Table 8 is applied in the case of:

• functional insulation: between the different poles of a switch. For the purpose of the test, all the parts of each pole are connected together;

• basic insulation: between all live parts connected together and a metal foil covering the outer accessible surface of the basic insulation and accessible metal parts in contact with the basic insulation;

• double insulation: between all live parts connected together and a metal foil covering the outer, normally not accessible, surface of basic insulation and non-accessible metal parts; then: between two metal foils covering separately the inner, normally not accessible, surface of supplementary insulation and connected to non-accessible metal parts, and the outer accessible surface of supplementary insulation and connected to accessible metal parts;

• reinforced insulation: between all live parts connected together and a metal foil covering the outer accessible surface of reinforced insulation and accessible metal parts;

• contacts: between the open contacts of each pole of a switch at the test voltages for "across electronic disconnection".

The foils are not pressed into openings but are pushed into corners and the like by means of the standard test finger.

In cases where basic insulation and supplementary insulation cannot be tested separately, the insulation provided is subjected to the test voltages specified for reinforced insulation.

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

15.2 Measurement of insulation resistance

IEC 61058-1:2016, 15.2 is not applicable.

16 Heating

Clause 16 of IEC 61058-1:2016 is not applicable.

NOTE The requirements of this clause are covered in the end-product standard.

17 Endurance – Mechanical switches

Clause 17 of IEC 61058-1:2016 is replaced by the following.

Clause 17 of IEC 61058-1-1 is applicable, except as follows:

NOTE The requirements for mechanical switches (IEC 61058-1-1) are followed by the requirements specific to electronic switches (IEC 61058-1-2). As a result, some subclause numbers are repeated.

17.1.2 *Replacement:*

The sequence of tests to be completed on the same 3 samples is as follows:

- *a test at accelerated speed as specified in 17.5.4 (TC4);*
- *a functional compliance test in accordance with 17.6.1 (TE1);*
- *a dielectric strength test in accordance with 17.6.3 (TE3).*

17.1.3 IEC 61058-1-1:2016, 17.1.3 is not applicable.

17.2 Electrical endurance tests

Replacement

The switch shall be loaded as specified in Table 201 and/or Table 202 and connected in accordance with the circuit as given in IEC 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 IEC 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) No electrical load is applied during the endurance tests for switches classified according to 7.2.6 with a rating of 20 mA or less.

Replacement:

Table 102 (IEC 61058-1-1:2016) with Table 201 (IEC 61058-2-6:2018)

Table 103 (IEC 61058-1-1:2016) with Table 202 (IEC 61058-2-6:2018)

17.3 Thermal conditions

IEC 61058-1-1:2016, 17.3 is not applicable.

17.4 Actuating conditions

IEC 61058-1-1:2016, 17.4 is applicable except as follows.

17.4.1 *Replacement:*

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 linear actions, the switch actuation speed shall be approximately 80 mm/s (mechanical);

• for rotary actions, the switch actuation speed shall be approximately 90°/s (mechanical).

17.4.3 IEC 61058-1-1:2016, 17.4.3 is not applicable.

17.5 Type of test condition (TC)

IEC 61058-1-1:2016, 17.5 is applicable except as follows.

17.5.1 Increased-voltage test at accelerated speed (TC1)

IEC 61058-1-1:2016, 17.5.1 is not applicable.

17.5.2 Test at slow speed (TC2)

IEC 61058-1-1:2016, 17.5.2 is not applicable.

17.5.3 Test at high speed (TC3)

IEC 61058-1-1:2016, 17.5.3 is not applicable.

17.5.4 Test at accelerated speed (TC4)

Replacement:

The electrical conditions are those specified in 17.2.

The thermal conditions are as follows: Tests are carried out at 25 °C ± 10 °C. The total number of operations shall be declared by the manufacturer.

NOTE Typically the total number of operations is 50 000 for hand-held tools, 10 000 for transportable tools and 10 000 for lawn and garden machinery.

The method of operation is that specified for accelerated speed in 17.4.

17.5.5 Locked-rotor test (TC9)

IEC 61058-1-1:2016, 17.5.5 is not applicable.

17.5.6 Test at very slow speed (TC10)

IEC 61058-1-1:2016, 17.5.6 is not applicable.

17.6 Evaluation of compliance

IEC 61058-1-1:2016, 17.6 is applicable, except as follows.

17.6.2 Thermal compliance (TE2)

IEC 61058-1-1:2016, 17.6.2 is not applicable.

17 Endurance – Electronic switches

Clause 17 of IEC 61058-1-2:2016 is applicable, except as follows.

17.1.2 *Replacement:*

For electronic switches (complete switch) the sequence of tests to be completed on the same 3 samples is as follows:

- *a test at accelerated speed as specified in 17.5.4 (TC4);*
- *when declared for locked rotor, a test at accelerated speed as specified in 17.5.9 (TC9);*
- *a functional compliance test in accordance with 17.6.1 (TE1);*
- *a dielectric strength test in accordance with 17.6.3 (TE3).*

Additionally 3 new specimens shall be prepared and tested as follows:

- *the SD (semiconductor device and assembly) in series with contact(s) is short circuited and/or the SD in parallel with contact(s) is disconnected;*
- *a test at accelerated speed as specified in 17.5.7 (TC7).*

The number of operating cycles is 1 000 or the declared number (if different).

17.2 Electrical conditions

Replacement:

The switch shall be loaded and tested as specified in Table 201 and/or Table 202, and connected in accordance with the circuit in IEC 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 IEC 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) No electrical load is applied during the endurance tests for switches classified according to 7.2.6 with a rating of 20 mA or less.

d) For electronic switches, the test circuit shall be as shown in IEC 61058-1:2016, Figure 16. The declared load shall be set at rated voltage before the electronic switch is inserted into the circuit (the load is not readjusted).

Replacement:

Table 104 (IEC 61058-1-2) with Table 201 (IEC 61058-2-6:2018)

Table 105 (IEC 61058-1-2) with Table 202 (IEC 61058-2-6:2018)

Table 201
Test loads for electrical endurance tests for AC circuits

Type of circuit as classified in 7.2	Operation of contacts	Test voltage	Test current RMS [1]	Power factor [3]
Motor-operated tools and motor-operated lawn and garden machinery	Making [2]	Rated voltage	6 × *I-M*	0,60 (+0,05)
			or *I-R*	or ≥ 0,9
	Breaking	Rated voltage	*I-R*	≥ 0,9
			or *I-M*	or ≥ 0,9[4]
Magnetically driven tools and magnetically driven lawn and garden machinery; also acceptable for motor-operated tools and motor-operated lawn and garden machinery	Making [2]	Rated voltage	6 × *I-I*	0,60 (+0,05)
	Breaking	Rated voltage	*I-I*	0,60 (+0,05)
Declared specific load (classified in 7.2.5)	Making and breaking	As determined by load		

NOTE
I-I: inductive-load current
I-M: motor-load current
I-R: resistive-load current

Table 201 Continued on Next Page

Table 201 Continued

Type of circuit as classified in 7.2	Operation of contacts	Test voltage	Test current RMS [1)]	Power factor [3)]
[1)] Whichever is arithmetically greater or the most unfavourable value in case of equal values. [2)] 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. For all switches except electronic 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. For electronic switches, the reduction to the break current should be achieved without any open circuiting of the simulated inductive loads circuit, to ensure that no abnormal voltage transients are generated. A typical method of achieving this is shown in Figure 16. [3)] 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. [4)] The test circuit condition for testing electronic switches, according to Figure 16, shall be substantially resistive.				

Table 202
Test loads for electrical endurance tests for DC circuits

Type of circuit as classified in 7.2	Operation of contacts	Test voltage	Test current	Time constant
Declared specific load (classified in 7.2.5)	Making and breaking	Rated voltage	As determined by load	

17.3 Thermal conditions

IEC 61058-1-2:2016, 17.3 is not applicable.

17.4 Actuating conditions

IEC 61058-1-2:2016, 17.4 applies with the following exceptions.

17.4.1 *Replacement:*

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 linear actions, the switch actuation speed shall be approximately 25 mm/s (electronic);*

• *for rotary actions, the switch actuation speed shall be approximately 45°/s (electronic).*

17.4.3 IEC 61058-1-2:2016, 17.4.3 is not applicable.

17.5 Type of test condition (TC)

IEC 61058-1-2:2016, 17.5 applies with the following exceptions.

17.5.1 Increased-voltage test at accelerated speed (TC1)

IEC 61058-1-2:2016, 17.5.1 is not applicable.

17.5.2 Test at slow speed (TC2)

IEC 61058-1-2:2016, 17.5.2 is not applicable.

17.5.3 Test at high speed (TC3)

IEC 61058-1-2:2016, 17.5.3 is not applicable.

17.5.4 Test at accelerated speed (TC4)

Replacement:

The electrical conditions are those specified in 17.2.

The thermal conditions are as follows: Tests are carried out at 25 °C ± 10 °C. The total number of operations shall be declared by the manufacturer.

NOTE Typically the total number of operations is 50 000 for hand-held tools, 10 000 for transportable tools and 10 000 for lawn and garden machinery.

The method of operation is that specified for accelerated speed in 17.4.

17.5.5 Manual functional test (TC5)

IEC 61058-1-2:2016, 17.5.5 is not applicable.

17.5.6 Functional test at minimum load (TC6)

IEC 61058-1-2:2016, 17.5.6 is not applicable.

17.5.7 Test with limited number of operations (TC7)

Replacement:

The electrical conditions are those specified in 17.2. The thermal conditions are 25 °C ± 10 °C.

The number of operating cycles is 1 000 or greater as declared by the manufacturer.

The method of operation is that specified in 17.4.1 for accelerated speed.

17.5.8 Endurance complete switch (TC8)

IEC 61058-1-2:2016, 17.5.8 is not applicable.

17.5.10 Test at very slow speed (TC10)

IEC 61058-1-2:2016, 17.5.10 is not applicable.

17.6 Evaluation of compliance

IEC 61058-1-2:2016, 17.6 is applicable, except as follows.

17.6.2 Thermal compliance (TE2)

IEC 61058-1-2:2016, 17.6.2 is not applicable.

18 Mechanical strength

Clause 18 of IEC 61058-1:2016 is not applicable.

NOTE The requirements of this clause are covered in the end-product standard.

19 Screws, current-carrying parts and connections

Clause 19 of IEC 61058-1:2016 is applicable.

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.

21.1 Resistance to heat

Replacement: (replacing 21.1.1, 21.1.2, 21.1.3 and 21.1.4)

Parts of non-metallic material shall be resistant to heat.

This requirement does not apply to small parts, to decorative trims, actuators which are not integral with the actuating means, or to other parts for which no tests are required.

NOTE The definition for small parts is given in 3.15 of IEC 60695-2-11:2014.

Compliance is checked with new samples using the ball pressure test according to IEC 60695-10-2 at the following temperatures:

a) at 75 °C ± 2 °C:

> *for parts which are accessible when the switch is mounted as declared, and the deterioration of which may result in the switch becoming unsafe (e. g. reduction in the declared degree of protection, or reduction of creepage and clearances below those values required according to Clause 20);*

b) at 125 °C ± 2 °C:

> *– for parts which are in contact with, maintain or retain in position electrical connections including those parts which maintain an electrical connection under spring force, for example a connection within the switch maintained in position by a spring in association with a non-metallic part, the deterioration of which could cause overheating;*
>
> *– for parts which are in contact with or support heat-sources (for example, heat sinks).*