IEC 61020-1

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INTERNATIONAL STANDARD

NORME INTERNATIONALE

Electromechanical switches for use in electrical and electronic equipment – Part 1: Generic specification

Interrupteurs électromécaniques pour équipements électriques et électroniques – Partie 1: Spécification générique

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

COMMISSION ELECTROTECHNIQUE INTERNATIONALE

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

ELECTROMECHANICAL SWITCHES FOR USE IN ELECTRICAL AND ELECTRONIC EQUIPMENT –

Part 1: Generic specification

FOREWORD

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International Standard IEC 61020-1 has been prepared by subcommittee 23J: Switches for appliances, of IEC technical committee 23: Electrical accessories.

This third edition cancels and replaces the second edition published in 2009.

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

a) In accordance with the ISO/IEC Directives, Part 2:2016, Clause 2 General has been replaced by two new clauses: Clause 2 Normative references and Clause 3 Terms, definitions, units and symbols.

   2.4 Preferred values and 2.5 Marking have been moved to Clauses 5 and 6. In addition, 6.2 Markings on packaging has been added.

b) Clause 3 Quality assurance procedures and Annex A have been deleted.

c) 4.3.6.3 Returning force has been added.

d) 4.3.6.4 Travel (movement of the actuator) has been added.

e) 4.12 Environmental testing:

4.12.1.3 and 4.12.1.5 have been renumbered 4.12.2 and 4.12.3, respectively. 4.12.1.4 and 4.12.1.7 have been integrated in 4.12.5. 4.12.10 Salt mist has been added.

f) Following publication of IEC 61058-1-1:2016, some cross-references to IEC 61058-1 have been updated.

g) The following items have been updated with respect to the second edition.

   – Tables and figures:

     Tables 1 and 3 have been deleted, Table 4 has been renumbered to Table 10. New Tables 2, 3, 4, 5, 6, 7, 8 and 9 have been added.

     Figure 1 has been renumbered to Figure 3, Figure 2 renumbered to Figure 4, Figure 3 renumbered to Figure 9 and Figure 4 renumbered to Figure 12. Added new Figures 1, 2, 5, 6, 7, 8, 10 and 11 have been added.

   – Specific words and common names have been unified.

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

CDV	Report on voting
23J/443/CDV	23J/448/RVC

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

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

A list of all parts in the IEC 61020 series, published under the general title *Electromechanical switches for use in electrical and electronic equipment*, 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.

INTRODUCTION

This document covers the general requirements and test methods for electromechanical switches with optional quality assurance procedures. It provides the general requirements and test methods for use in any detail specifications for pushbutton switches, rotary switches, sensitive switches, toggle switches, and other electromechanical switches.

Where it is intended that an electromechanical switch comply with requirements related to safety, the specific safety requirements will be specified in IEC 61058-1.

ELECTROMECHANICAL SWITCHES FOR USE IN ELECTRICAL AND ELECTRONIC EQUIPMENT –

Part 1: Generic specification

1 Scope

This part of IEC 61020 specifies the terminology, symbols, test methods and other necessary information to provide consistency in detail specifications for electromechanical switches.

This document relates to electromechanical switches intended for use in electrical and electronic appliances. Switches covered by this document:

a) are devices which open, close, or change the connection of a circuit by the mechanical motion of conducting parts (contacts);

b) have a maximum rated voltage of 480 V;

c) have a maximum rated current of 63 A.

This document does not include keyboards and keypads which are intended for use in information-handling systems. Electromechanical key switches can be included under the scope of this document.

Switch families will be described in any detail specifications that reference this document.

This document is a performance standard intended to describe evaluation methods to better clarify the capabilities of a switch.

NOTE 1 Safety requirements for switches for household and similar fixed electrical installations are given in IEC 60669 (all parts).

NOTE 2 Safety requirements for appliance switches are given in IEC 61058 (all parts).

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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.

IEC 60027 (all parts*), Letter symbols to be used in electrical technology*

IEC 60050-581, *International Electrotechnical Vocabulary – Part 581: Electromechanical components for electronic equipment*

IEC 60068-1:2013, *Environmental testing – Part 1: General and guidance*

IEC 60068-2-1, *Environmental testing – Part 2-1: Tests – Test A: Cold*

IEC 60068-2-2, *Environmental testing – Part 2-2: Tests – Test B: Dry Heat*

IEC 60068-2-6, *Environmental testing – Part 2-6: Tests – Test Fc: Vibration (sinusoidal)*

IEC 60068-2-10, *Environmental testing – Part 2-10: Tests – Test J and guidance: Mould growth*

IEC 60068-2-11, *Environmental testing – Part 2-11: Tests – Test Ka: Salt mist*

IEC 60068-2-13, *Environmental testing – Part 2-13: Tests – Test M: Low air pressure*

IEC 60068-2-14, *Environmental testing – Part 2-14: Tests – Test N: Change of temperature*

IEC 60068-2-17, *Environmental testing – Part 2-17: Tests – Test Q: Sealing*

IEC 60068-2-20:2008, *Environmental testing – Part 2-20: Tests – Test T: Test methods for solderability and resistance to soldering heat of devices with leads*

IEC 60068-2-21, *Environmental testing – Part 2-21: Tests – Test U: Robustness of terminations and integral mounting devices*

IEC 60068-2-27, *Environmental testing – Part 2-27: Tests – Test Ea and guidance: Shock*

IEC 60068-2-30:2005, *Environmental testing – Part 2-30: Tests – Test Db: Damp heat, cyclic (12 h + 12 h cycle)*

IEC 60068-2-38:2009, *Environmental testing – Part 2-38: Tests – Test Z/AD: Composite temperature/humidity cyclic test*

IEC 60068-2-42, *Environmental testing – Part 2-42: Tests – Test Kc: Sulphur dioxide test for contacts and connections*

IEC 60068-2-43, *Environmental testing – Part 2-43: Tests – Test Kd: Hydrogen sulphide test for contacts and connections*

IEC 60068-2-45, *Environmental testing – Part 2-45: Tests – Test XA and guidance: Immersion in cleaning solvents*

IEC 60068-2-46, *Basic environmental testing procedures – Part 2-46: Tests – Guidance to test Kd: Hydrogen sulphide test for contacts and connections*

IEC 60068-2-49, *Basic environmental testing procedures – Part 2-49: Tests – Guidance to Test Kc: Sulphur dioxide test for contacts and connections*

IEC 60068-2-58:2015, *Environmental testing Part 2-58: Tests, Tests Td: Test methods for solderability, resistance to dissolution of metallization and to soldering heat of surface mounting devices (SMD)*
IEC 60068-2-58:2015/AMD1:2017

IEC 60068-2-61:1991, *Environmental testing – Part 2-61: Test methods; Test Z/ABDM: Climatic sequence*

IEC 60068-2-68:1994, *Environmental testing – Part 2-68: Tests – Test L: Dust and sand*

IEC 60068-2-77, *Environmental testing – Part 2-77: Tests – Test 77: Body strength and impact shock*

IEC 60068-2-78, *Environmental testing – Part 2-78: Tests, Test Cab: Damp heat, steady state*

IEC 60529, *Degrees of protection provided by enclosures (IP Code)*

IEC 60617, *Graphical symbols for diagrams* (available at: http://std.iec.ch/iec60617)

IEC 60721-3-3, *Classification of environmental conditions – Part 3-3: Classification of groups of environmental parameters and their severities – Stationary use at weatherprotected locations*

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

IEC 61058-1-1:2016, *Switches for appliances – Part 1-1: Requirements for mechanical switches*

ISO 80000-1, *Quantities and units – Part 1: General*

3 Terms, definitions, units and symbols

3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 60050-581 and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at http://www.electropedia.org/
- ISO Online browsing platform: available at http://www.iso.org/obp

Note 1 to entry: Terminology peculiar to a particular switch subfamily is defined in the applicable detail specification. Terminology peculiar to a group of structurally similar switches is defined in the detail specification.

Note 2 to entry: The following terminology is common to all electromechanical switches. Where the definition is compatible with an established IEC 60050 definition, the IEC 60050 reference for the related definition is given as source information.

3.1.1
category temperature range
range of ambient temperature for which the switch has been designed to operate continuously

3.1.2
clearance
shortest distance in air between two conductive parts

3.1.3
contact bounce
intermittent and random opening of closed contacts and closing of open contacts which may occur after contact transfer and which is caused by the switch mechanism

3.1.4
contact bounce time
time period measured from the moment of first closure of two mating contacts or first opening of two closed contacts to the moment when all contact bounce ceases

3.1.5
contact disturbance
intermittent and random closing of open contacts and/or opening of closed contacts caused by external influences such as shock and vibration

3.1.6
creepage distance
shortest distance along the surface of the insulation material between two conductive parts

[SOURCE: IEC 60050-151:2001, 151-15-50, modified – “a solid insulating material” has been replaced by “the insulation material”.]

3.1.7
detail specification
declarations of switch parameters including ratings, test conditions and performance criteria, agreed upon by the manufacturer and/or all interested parties

3.1.8
duty cycle
ratio of conducting (ON) time to the total time for one cycle

EXAMPLE 30 % ON.

3.1.9
electrical load
element connected to a circuit to pass a certain current through a specimen switch

Note 1 to entry: Resistor, coil and capacitor are examples of elements.

3.1.10
electromechanical switch
switch which opens, closes, or changes the connection of an electrical circuit by the mechanical motion of conducting parts (contacts)

3.1.11
latch
latching mechanism for holding the button at the position when the operating button of a switch is pushed down

3.1.12
lever switch
switch where the actuating member is a lever which has to be moved (tilted) to one or more indexed positions in order to achieve a change in contact state

3.1.13
lower category temperature
minimum ambient temperature for which a switch has been designed to operate continuously

3.1.14
mounting bushing
component of a switch by which the switch is mounted on an equipment and which also serves as a bearing

3.1.15
operating cycle
succession of operations from one position to another and back to the first position through all other positions, if any

[SOURCE: IEC 60050-441:2000, 441-16-02]

3.1.16
operation
movement of a contact from a position to an adjacent position

3.1.17
operation test
test in which a switch is operated with the electric load connected under the simulated state of actual use

3.1.18
pole
<of a switch> part associated exclusively with one, electrically separated, conducting path of the switch

Note 1 to entry: Those parts that provide a means for mounting and operating all poles together are excluded from the definition of a pole.

Note 2 to entry: A switch is called "single-pole" if it has only one pole. If it has more than one pole, it may be called "multi-pole" (two-pole, three-pole, etc.) provided that the poles are coupled in such a manner as to operate together.

3.1.19
push-button switch
switch where the actuating member is a button which has to be pushed in order to achieve a change in contact state

3.1.20
rated current
current assigned by the manufacturer for a specified operating condition

3.1.21
rated voltage
voltage assigned by the manufacturer for a specified operating condition

3.1.22
returning force
force possessed by the automatic returning mechanism which returns the actuator to the position before operation when the operating force is removed

3.1.23
rocker switch
switch where the actuating member is a low profile lever (rocker) which has to be tilted to one or more indexed positions in order to achieve a change in contact state

3.1.24
rotary switch
switch where the actuating member is a shaft or a spindle which has to be rotated to one or more indexed positions in order to achieve a change in contact state

Note 1 to entry: The rotation of the actuating member may be unlimited or restricted in either direction.

3.1.25
slide switch
switch, the actuating member of which is a button which has to be displaced laterally in order to achieve a change in contact state

3.1.26
surface mounting switch
small-sized switch which is suitable for surface mounting on the printed wiring board, consisting of terminals and framing parts

3.1.27
upper category temperature
maximum ambient temperature for which a switch has been designed to operate continuously

3.2 Units and symbols

Units, graphical symbols, and letter symbols shall be, whenever possible, in accordance with ISO 80000-1, IEC 60617 and IEC 60027 (all parts), respectively.