

---

**Elektromehanska stikala za električno in elektronsko opremo - 1. del: Rodovna specifikacija (IEC 61020-1:2019)**

Electromechanical switches for use in electrical and electronic equipment - Part 1: Generic specification (IEC 61020-1:2019)

Elektromechanische Schalter zur Verwendung in Geräten der Elektrotechnik und Elektronik – Teil 1: Fachgrundspezifikation (IEC 61020-1:2019)

Interrupteurs électromécaniques pour équipements électriques et électroniques - Partie 1: Spécification générique (IEC 61020-1:2019)

**Ta slovenski standard je istoveten z: EN IEC 61020-1:2019**

---

**ICS:**

31.220.20      Stikala      Switches

**SIST EN 61020-1:2019**      **en,fr,de**

**ITeH STANDARD PREVIEW**  
**(standards.iteh.ai)**

Full standard:  
<https://standards.iteh.ai/catalog/standards/sist/abb3d7db-7a25-4794-8bb0-c62bae41a4d7/sist-en-61020-1-2019>

EUROPEAN STANDARD  
NORME EUROPÉENNE  
EUROPÄISCHE NORM

**EN IEC 61020-1**

March 2019

ICS 31.220.20

Supersedes EN 61020-1:2009

English Version

**Electromechanical switches for use in electrical and electronic  
equipment - Part 1: Generic specification  
(IEC 61020-1:2019)**

Interrupteurs électromécaniques pour équipements  
électriques et électroniques - Partie 1: Spécification  
générique  
(IEC 61020-1:2019)

Elektromechanische Schalter zur Verwendung in Geräten  
der Elektrotechnik und Elektronik - Teil 1:  
Fachgrundspezifikation  
(IEC 61020-1:2019)

This European Standard was approved by CENELEC on 2019-02-20. 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, Serbia, 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: Rue de la Science 23, B-1040 Brussels**

**EN IEC 61020-1:2019 (E)****European foreword**

The text of document 23J/443/CDV, future edition 3 of IEC 61020-1, 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 IEC 61020-1:2019.

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) 2019-11-20
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2022-02-20

This document supersedes EN 61020-1:2009.

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

**Endorsement notice**

The text of the International Standard IEC 61020-1:2019 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following notes have to be added for the standards indicated:

IEC 60062:2016	NOTE	Harmonized as EN 60062:2016 (not modified)
IEC 60065	NOTE	Harmonized as EN 60065
IEC 60068-3-13	NOTE	Harmonized as EN 60068-3-13
IEC 60512 (series)	NOTE	Harmonized as EN IEC 60512 (series)
IEC 60664-1	NOTE	Harmonized as EN 60664-1
IEC 60695-11-10	NOTE	Harmonized as EN 60695-11-10
IEC 61190-1-3	NOTE	Harmonized as EN IEC 61190-1-3
ISO/IEC 17050-1	NOTE	Harmonized as EN ISO/IEC 17050-1
ISO/IEC 17050-2	NOTE	Harmonized as EN ISO/IEC 17050-2
ISO 129-1	NOTE	Harmonized as EN ISO 129-1 <sup>1</sup>
ISO 286-1	NOTE	Harmonized as EN ISO 286-1
ISO 1101	NOTE	Harmonized as EN ISO 1101
ISO 9001	NOTE	Harmonized as EN ISO 9001

<sup>1</sup> Under preparation. Stage at the time of publication: prEN ISO 129-1:2018.

## Annex ZA (normative)

### Normative references to international publications with their corresponding European publications

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.

NOTE 1 Where 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](http://www.cenelec.eu).

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 60027	series	Letter symbols to be used in electrical technology	EN IEC 60027	series
IEC 60050-581	-	International Electrotechnical Vocabulary - Part 581: Electromechanical components for electronic equipment	-	-
IEC 60068-1	2013	Environmental testing - Part 1: General and guidance	EN 60068-1	2014
IEC 60068-2-1	-	Environmental testing - Part 2-1: Tests - Test A: Cold	EN 60068-2-1	-
IEC 60068-2-2	-	Environmental testing - Part 2-2: Tests - Test B: Dry heat	EN 60068-2-2	-
IEC 60068-2-6	-	Environmental testing - Part 2-6: Tests - Test Fc: Vibration (sinusoidal)	EN 60068-2-6	-
IEC 60068-2-10	-	Environmental testing - Part 2-10: Tests - Test J and guidance: Mould growth	EN 60068-2-10	-
IEC 60068-2-11	-	Basic environmental testing procedures - Part 2-11: Tests - Test Ka: Salt mist	EN 60068-2-11	-
IEC 60068-2-13	-	Basic environmental testing procedures - Part 2-13: Tests - Test M: Low air pressure	EN 60068-2-13	-
IEC 60068-2-14	-	Environmental testing - Part 2-14: Tests - Test N: Change of temperature	EN 60068-2-14	-
IEC 60068-2-17	-	Basic environmental testing procedures - Part 2-17: Tests - Test Q: Sealing	EN 60068-2-17	-
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	EN 60068-2-20	2008
IEC 60068-2-21	-	Environmental testing - Part 2-21: Tests - Test U: Robustness of terminations and integral mounting devices	EN 60068-2-21	-
IEC 60068-2-27	-	Environmental testing - Part 2-27: Tests - Test Ea and guidance: Shock	EN 60068-2-27	-

## EN IEC 61020-1:2019 (E)

IEC 60068-2-30	2005	Environmental testing - Part 2-30: Tests - Test Db: Damp heat, cyclic (12 h + 12 h cycle)	EN 60068-2-30	2005
IEC 60068-2-38	2009	Environmental testing - Part 2-38: Tests - Test Z/AD: Composite temperature/humidity cyclic test	EN 60068-2-38	2009
IEC 60068-2-42	-	Environmental testing - Part 2-42: Tests - Test Kc: Sulphur dioxide test for contacts and connections	EN 60068-2-42	-
IEC 60068-2-43	-	Environmental testing - Part 2-43: Tests - Test Kd: Hydrogen sulphide test for contacts and connections	EN 60068-2-43	-
IEC 60068-2-45	-	Basic environmental testing procedures - Part 2-45: Tests - Test XA and guidance: Immersion in cleaning solvents	EN 60068-2-45	-
IEC 60068-2-46	-	Basic environmental testing procedures - Part 2-46: Tests - Guidance to test Kd: Hydrogen sulphide test for contacts and connections	HD 323.2.46 S1	-
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 - Test Td: Test methods for solderability, resistance to dissolution of metallization and to soldering heat of surface mounting devices (SMD)	EN 60068-2-58	2015
+ A1	2017		+ A1	2018
IEC 60068-2-61	1991	Environmental testing - Part 2-61: Test methods - Test Z/ABDM: Climatic sequence	EN 60068-2-61	1993
IEC 60068-2-68	1994	Environmental testing - Part 2-68: Tests - Test L: Dust and sand	EN 60068-2-68	1996
IEC 60068-2-77	-	Environmental testing - Part 2-77: Tests - Test 77: Body strength and impact shock	EN 60068-2-77	-
IEC 60068-2-78	-	Environmental testing - Part 2-78: Tests - Test Cab: Damp heat, steady state	EN 60068-2-78	-
IEC 60529	-	Degrees of protection provided by enclosures (IP Code)	-	-
IEC 60617	-	Graphical symbols for diagrams (available at: <a href="http://std.iec.ch/iec60617">http://std.iec.ch/iec60617</a> )	-	-
IEC 60721-3-3	-	Classification of environmental conditions - Part 3: Classification of groups of environmental parameters and their severities - Section 3: Stationary use at weather protected locations	EN 60721-3-3	-
IEC 61058-1	2016	Switches for appliances - Part 1: General requirements	EN IEC 61058-1	2018
IEC 61058-1-1	2016	Switches for appliances - Part 1-1: Requirements for mechanical switches	EN 61058-1-1	2016
ISO 80000-1	-	Quantities and units - Part 1: General	-	-



# 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**

INTERNATIONAL  
ELECTROTECHNICAL  
COMMISSION

COMMISSION  
ELECTROTECHNIQUE  
INTERNATIONALE

ICS 31.220.20

ISBN 978-2-8322-6388-4

**Warning! Make sure that you obtained this publication from an authorized distributor.  
Attention! Veuillez vous assurer que vous avez obtenu cette publication via un distributeur agréé.**

## CONTENTS

FOREWORD.....	6
INTRODUCTION.....	8
1 Scope.....	9
2 Normative references.....	9
3 Terms, definitions, units and symbols.....	11
3.1 Terms and definitions.....	11
3.2 Units and symbols.....	13
4 Test and measurement procedures.....	14
4.1 General.....	14
4.1.1 General requirements to tests and measuring procedures.....	14
4.1.2 Tolerances.....	14
4.1.3 Preconditioning.....	14
4.1.4 Mounting.....	14
4.2 Standard atmospheric conditions.....	14
4.3 General examination.....	15
4.3.1 Visual examination.....	15
4.3.2 Dimensions.....	15
4.3.3 Dimensions, gauging.....	16
4.3.4 Mass.....	16
4.3.5 Functional operation.....	17
4.3.6 Operating characteristics.....	17
4.3.7 Contact bounce.....	21
4.4 Resistance measurements.....	23
4.4.1 Contact resistance – Millivolt level.....	23
4.4.2 Contact resistance – Specified current.....	26
4.4.3 Resistance from actuator to mounting bushing (surface).....	27
4.4.4 Insulation resistance.....	28
4.5 Withstand voltage.....	29
4.5.1 Withstand voltage at standard atmospheric conditions.....	29
4.5.2 Withstand voltage at low air pressure.....	30
4.6 Heating.....	31
4.6.1 Object.....	31
4.6.2 Method.....	31
4.6.3 Requirement.....	31
4.6.4 Items to be specified in the detail specification.....	31
4.7 Dynamic stress.....	32
4.7.1 Shock.....	32
4.7.2 Vibration.....	32
4.7.3 Contact disturbance.....	33
4.8 Mechanical strength.....	34
4.8.1 Robustness of actuator.....	34
4.8.2 Robustness of mounting bushing.....	37
4.8.3 Robustness of screw mounting.....	37
4.8.4 Robustness of terminations.....	37
4.9 Mechanical endurance.....	38
4.9.1 Mechanical endurance – Standard atmospheric conditions.....	38
4.9.2 Mechanical endurance – Category temperature range.....	39



4.10	Electrical endurance .....	40
4.10.1	Electrical endurance – Standard atmospheric conditions .....	40
4.10.2	Electrical endurance – Upper category temperature.....	42
4.10.3	Electrical endurance – Category temperature range .....	43
4.10.4	Electrical endurance – low air pressure .....	43
4.10.5	Logic loads (TTL).....	44
4.10.6	Low level endurance test .....	45
4.11	Overload .....	46
4.11.1	Electrical overload .....	46
4.11.2	Capacitive load switching .....	47
4.12	Environmental testing .....	48
4.12.1	Climatic sequence .....	48
4.12.2	Dry heat .....	50
4.12.3	Cold.....	51
4.12.4	Damp heat, steady state .....	53
4.12.5	Damp heat, cyclic .....	54
4.12.6	Rapid change of temperature.....	56
4.12.7	Mould growth (resistance).....	57
4.12.8	Corrosion, industrial atmosphere .....	58
4.12.9	Dust and sand .....	62
4.12.10	Salt mist .....	64
4.12.11	Contact resistance stability.....	65
4.13	Soldering .....	66
4.13.1	Solderability, wetting, solder bath method.....	66
4.13.2	Solderability, wetting, soldering iron method .....	67
4.13.3	Solderability, dewetting.....	68
4.13.4	Resistance to soldering heat, solder bath method .....	68
4.13.5	Resistance to soldering heat, soldering iron method .....	69
4.14	Panel seal.....	70
4.14.1	General .....	70
4.14.2	Drip – Proof.....	70
4.14.3	Splash – Proof.....	70
4.14.4	Immersion.....	71
4.14.5	Submersion .....	72
4.15	Enclosure seal .....	73
4.15.1	General .....	73
4.15.2	Watertight immersion .....	73
4.15.3	Resilient or hermetic seal .....	74
4.16	Fluid resistance – Immersion in cleaning solvents (marking) .....	74
4.16.1	Object.....	74
4.16.2	Method .....	74
4.16.3	Requirement.....	75
4.16.4	Items to be specified in the detail specification .....	75
4.17	Fire hazard .....	75
4.18	Capacitance.....	75
4.18.1	Object.....	75
4.18.2	Method .....	75
4.18.3	Requirement.....	75
4.18.4	Items to be specified in the detail specification .....	75

4.19	Illumination .....	76
4.19.1	Chromaticity .....	76
4.19.2	Transmittancy.....	76
4.19.3	Temperature of illuminated surface.....	77
4.20	Soldering for surface mounting switches .....	77
4.20.1	Solderability, solder bath method (surface mounting switches) .....	77
4.20.2	Solderability, reflow method (surface mounting switches) .....	78
4.20.3	Solderability, soldering iron method (surface mounting switches).....	79
4.20.4	Resistance to soldering heat, solder bath method (surface mounting switches) .....	80
4.20.5	Resistance to soldering heat, reflow method (surface mounting switches) .....	80
4.20.6	Resistance to soldering heat, soldering iron method (surface mounting switches) .....	81
4.21	Mechanical strength (surface mounting switches) .....	82
4.21.1	Substrate bending (surface mounting switches) .....	82
4.21.2	Pull-off and push-off (surface mounting switches).....	82
4.21.3	Shear (surface mounting switches) .....	83
4.21.4	Body strength (surface mounting switches).....	84
5	Preferred values .....	84
5.1	General.....	84
5.2	Clearance and creepage distances .....	84
6	Marking .....	85
6.1	Markings on switch body .....	85
6.2	Markings on packaging .....	85
	Bibliography.....	86
	Figure 1 – Measuring direction of operating force and torque .....	18
	Figure 2 – Example of measuring points specified in detail specifications .....	20
	Figure 3 – Contact bounce test circuit.....	22
	Figure 4 – Typical trace of contact bounce.....	22
	Figure 5 – Low voltage and current method (by DC) .....	25
	Figure 6 – Low voltage and current method (by AC).....	25
	Figure 7 – Specified current method (by DC) .....	27
	Figure 8 – Specified current method (by AC).....	27
	Figure 9 – Application of forces and torques for 4.8.1 .....	36
	Figure 10 – Composition of one cycle .....	56
	Figure 11 – Composition of cycle of test procedure .....	63
	Figure 12 – Submersion seal enclosure .....	73
	Table 1 – Torque values for mounting screws .....	37
	Table 2 – Climatic sequence .....	49
	Table 3 –Remain cycles.....	49
	Table 4 – Concentration of H <sub>2</sub> S .....	59
	Table 5 – Test temperature .....	59
	Table 6 – Test duration.....	59
	Table 7 – Concentration of SO <sub>2</sub> .....	61

Table 8 – Test temperature ..... 61  
Table 9 – Test duration ..... 61  
Table 10 – Solderability, bath method: Test severities (duration and temperature).....67

**ITeH STANDARD PREVIEW**  
(standards.iteh.ai)  
Full standard:  
<https://standards.iteh.ai/catalog/standards/sist/abb3d7db-7a25-4794-8bb0-c62bae41a4f7/sist-en-61020-1-2019>

## INTERNATIONAL ELECTROTECHNICAL COMMISSION

**ELECTROMECHANICAL SWITCHES  
FOR USE IN ELECTRICAL AND ELECTRONIC EQUIPMENT –****Part 1: Generic specification**

## 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 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.