IEC 60669-2-5

Edition 1.0 2013-10

INTERNATIONAL STANDARD

NORME INTERNATIONALE

colour inside

Switches for household and similar fixed electrical installations – Part 2-5: Particular requirements – Switches and related accessories for use in home and building electronic systems (HBES)

Interrupteurs pour installations électriques fixes domestiques et analogues – Partie 2-5: Prescriptions particulières – Interrupteurs et appareils associés pour usage dans les systèmes électroniques des foyers domestiques et bâtiments (HBES)

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ELECTROTECHNICAL
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COMMISSION
ELECTROTECHNIQUE
INTERNATIONALE

PRICE CODE
CODE PRIX X

ICS 29.120.40

ISBN 978-2-8322-1152-6

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CONTENTS

FOREWORD 4
1 Scope 6
2 Normative references 7
3 Terms and definitions 8
4 General requirements 10
5 General notes on tests 10
6 Rating 10
7 Classification 11
8 Marking 12
9 Checking of dimensions 12
10 Protection against electric shock 12
11 Provision for earthing 13
12 Terminals 13
13 Constructional requirements 14
14 Mechanism 14
15 Resistance to ageing, protection provided by enclosures of switches, and resistance to humidity 14
16 Insulation resistance and electric strength 14
17 Temperature rise 15
18 Making and breaking capacity 15
19 Normal operation 15
20 Mechanical strength 16
21 Resistance to heat 16
22 Screws, current-carrying parts and connections 16
23 Creepage distances, clearances and distances through sealing compound 16
24 Resistance of insulating material to abnormal heat, to fire and to tracking 22
25 Resistance to rusting 22
26 EMC requirements 22
101 Abnormal conditions 29
102 Components 30
Annex A (normative) Survey of specimens needed for tests 31
Annex B (normative) Additional requirements for switches having facilities for the outlet and retention of flexible cables 32
Annex C (informative) Examples of types of electronic switches and their functions 33
Annex AA (normative) Measurement of clearances and creepage distances 34
Annex BB (informative) Test set-ups 37
Bibliography 44

Figure 201 – Protective separation between circuits 19
Figure AA.1 – Narrow groove 34
Figure AA.2 – Wide groove 34
Figure AA.3 – V-shaped groove 34

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Figure AA.4 – Rib 35
Figure AA.5 – Uncemented joint with narrow groove 35
Figure AA.6 – Uncemented joint with wide groove 35
Figure AA.7 – Uncemented joint with narrow and wide grooves 35
Figure AA.8 – Intervening, unconnected conductive part 36
Figure AA.9 – Narrow recess 36
Figure AA.10 – Wide recess 36
Figure BB.1 – Test setup for AC mains connection according to IEC 61000-4-4 37
Figure BB.2 – Test setup for bus and DC mains connection according to IEC 61000-4-4 38
Figure BB.3 – Test setup for AC mains connection according to IEC 61000-4-5 39
Figure BB.4 – Test setup for bus and DC mains connection according to IEC 61000-4-5 40
Figure BB.5 – Test setup for the ESD according to IEC 61000-4-2 41
Figure BB.6 – Test setup for AC mains connection according to IEC 61000-4-6 42
Figure BB.7 – Test setup for bus and DC mains connection according to IEC 61000-4-6 43

Table 201 – Test loads for HBES switches for heating installations 16
Table 202 – Relation between the rated voltage of the HBES switch, the rated insulation voltage and the rated impulse voltage 17
Table 203 – Minimum clearances without verification test 19
Table 204 – Test voltages and corresponding altitudes 20
Table 205 – Minimum clearances with verification test 20
Table 206 – Minimum creepage distances of basic, supplementary and reinforced insulation without verification test 21
Table 207 – Minimum creepage distances of basic, supplementary and reinforced insulation with verification test 21
Table 208 – Immunity tests (overview) 24
Table 209 – Voltage dip and short-interruption test values 24
Table 210 – Surge immunity test voltages 25
Table 211 – Fast transient test values 26
Table 212 – Values for radiated electromagnetic field test of IEC 61000-4-3 27

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SWITCHES FOR HOUSEHOLD AND SIMILAR FIXED ELECTRICAL INSTALLATIONS –

Part 2-5: Particular requirements – Switches and related accessories for use in home and building electronic systems (HBES)

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International Standard IEC 60669-2-5 has been prepared by subcommittee 23B: Plugs, socket-outlets and switches, of IEC technical committee 23: Electrical accessories.

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

FDIS	Report on voting
23B/1110/FDIS	23B/1129/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.

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This part of IEC 60669 is partially based on IEC 60669-1:1998, its Amendment 1:1999 and Amendment 2:2006 and IEC 60669-2-1:2002 and its Amendment 1:2008. In cases where parts of these standards apply, this will be mentioned explicitly by a normative cross-reference describing the extent to which the referenced element (clause, subclause, figure, table, etc.) applies. Subclauses, figures, tables or notes which are additional to those in IEC 60669-1 and IEC 60669-2-1 and their amendments are numbered starting from 101 and 201 respectively, additional annexes are lettered AA, BB, etc.

This part of IEC 60669 lists the changes necessary to convert those standards into a specific standard for home and building electronic systems (HBES) switches and related accessories.

In this standard, the following print types are used:

– requirements proper: in roman type;
– *test specifications: in italic type;*
– notes: in smaller roman type.

A list of all parts in the IEC 60669 series, published under the general title *Switches for household and similar fixed-electrical installations,* can be found on the IEC website.

The following differences exist in the countries indicated below.

– Clause 26: all CENELEC countries.

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

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SWITCHES FOR HOUSEHOLD AND SIMILAR FIXED ELECTRICAL INSTALLATIONS –

Part 2-5: Particular requirements – Switches and related accessories for use in home and building electronic systems (HBES)

1 Scope

This part of IEC 60669 applies to HBES switches with a working voltage not exceeding 250 V a.c. and a rated current up to and including 16 A for household and similar fixed electrical installations either indoors or outdoors and to associated electronic extension units.

It applies to:

– HBES switches for the operation of lamp circuits and the control of the brightness of lamps (dimmers) as well as the control of the speed of motors (e.g. those used in ventilating fans) and for other purposes (e.g. heating installations);

– sensors, actuators, switched-socket-outlets, associated electronic extension units, etc.

In the present standard the word "HBES switch" is applied to describe all kinds of HBES devices e.g. switches, sensors, actuators, switched-socket-outlets, associated electronic extension units, etc.

The operation and control are performed:

– intentionally by a person via an actuating member, a key, a card, etc., via a sensing surface or a sensing unit, by means of touch, proximity, turn, optical, acoustic, thermal;

– by physical means, e.g. light, temperature, humidity, time, wind velocity, presence of people;

– by any other influence;

and transmitted:

– by an electronic signal via several media, e.g. powerline (mains), twisted pair, optical fibre, radio frequency, infra-red, etc.

HBES switches complying with this standard are suitable for use at ambient temperatures not normally exceeding 25 °C, but occasionally reaching 35 °C.

This part of IEC 60669also applies to mounting boxes for HBES switches, with the exception of those for flush-type HBES switches which are covered by IEC 60670-1.

NOTE 1 In the following country flush mounted boxes are covered by both EN 60670-1 and BS 4662: UK

Functional safety aspects of HBES switches are not covered by this standard. Functional safety requirements are covered by the standards of the devices which are controlled by the HBES.

In locations where special conditions prevail, e.g. higher temperature, special constructions may be required.

NOTE 2 This standard is not intended to cover devices falling within the scope of IEC 60730.

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NOTE 3 Within this Part 2-5, for any reference to IEC 60669-2-1 and its Amendment 1:2008, the term "electronic switches" is replaced by "HBES switches".

NOTE 4 In the following country, HBES switches complying with this standard are suitable for use at ambient temperatures not normally exceeding 35 °C, but occasionally reaching 40 °C: CN.

2 Normative references

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.

IEC 60050 (all parts), *International Electrotechnical Vocabulary,* available at: <http://www.electropedia.org>

IEC 60664-1:2007, *Insulation coordination for equipment within low-voltage systems – Part 1: Principles, requirements and tests*

IEC 60669-1:1998, *Switches for household and similar fixed-electrical installations – Part 1: General requirements*
Amendment 1:1998
Amendment 2:2006

IEC 60669-2-1:2002, *Switches for household and similar fixed electrical installations – Part 2-1: Particular requirements – Electronic switches*
Amendment 1:2008

IEC 60364-4-41, *Low-voltage electrical installations– Part 4-41: Protection for safety – Protection against electric shock*

IEC 60664-3, *Insulation coordination for equipment within low-voltage systems – Part 3: Use of coating, potting or moulding for protection against pollution*

IEC 60670-1, *Boxes and enclosures for electrical accessories for household and similar fixed electrical installations – Part 1: General requirements*

IEC 60715, *Dimensions of low-voltage switchgear and controlgear – Standardized mounting on rails for mechanical support of electrical devices in switchgear and controlgear installations*

IEC 60990*, Methods of measurement of touch current and protective conductor current*

IEC 61000-2-2, *Electromagnetic compatibility (EMC) – Part 2-2: Environment – Compatibility levels for low-frequency conducted disturbances and signalling in public low-voltage power supply systems*

IEC 61000-3-2, *Electromagnetic compatibility (EMC) – Part 3-2: Limits – Limits for harmonic current emissions (equipment input current ≤ 16A per phase)*

IEC 61000-3-3, *Electromagnetic compatibility (EMC) – Part 3-3: Limits – Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current ≤ 16 A per phase and not subject to conditional connection*

IEC 61000-4-2, *Electromagnetic compatibility (EMC) – Part 4-2: Testing and measurement techniques – Electrostatic discharge immunity test*

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IEC 61000-4-3, *Electromagnetic compatibility (EMC) – Part 4-3: Testing and measurement techniques – Radiated, radio-frequency, electromagnetic field immunity test*

IEC 61000-4-4, *Electromagnetic compatibility (EMC) – Part 4-4: Testing and measurement techniques – Electrical fast transient/burst immunity test*

IEC 61000-4-5, *Electromagnetic compatibility (EMC) – Part 4-5: Testing and measurement techniques – Surge immunity test*

IEC 61000-4-6, *Electromagnetic compatibility (EMC) – Part 4-6: Testing and measurement techniques – Immunity to conducted disturbances, induced by radio-frequency fields*

IEC 61000-4-8, *Electromagnetic compatibility (EMC) – Part 4-8: Testing and measurement techniques –Power frequency magnetic field immunity test*

IEC 61000-4-11, *Electromagnetic compatibility (EMC) – Part 4-11: Testing and measurement techniques – Voltage dips, short interruptions and voltage variations immunity tests*

IEC 61000-4-20:2010, *Electromagnetic compatibility (EMC) – Part 4-20: Testing and measurement techniques – Emission and immunity testing in transverse electromagnetic (TEM) waveguides*

IEC 61058-1, *Switches for appliances – Part 1: General requirements*
Amendment 1:2000
Amendment 2:2007

IEC 61140:2001, *Protection against electric shock – Common aspects for installation and equipment*

IEC 61558-2-6, *Safety of transformers, reactors, power supply units and similar products for supply voltages up to 1 100 V – Part 2-6: Particular requirements and tests for safety isolating transformers and power supply units incorporating safety isolating transformers*

CISPR 14 (all parts), *Electromagnetic compatibility – Requirements for household appliances, electric tools and similar apparatus*

CISPR 15, *Limits and methods of measurement of radio disturbance characteristics of electrical lighting and similar equipment*

CISPR 22, *Information technology equipment – Radio disturbance characteristics – Limits and methods of measurement*

3 Terms and definitions

Clause 3 of IEC 60669-2-1:2002 and its Amendment 1:2008 is applicable with the following additions:

3.201
HBES
home and building electronic systems
multi-application systems where functions are decentrally distributed and linked through a common communication process

Note 1 to entry: HBES is used in homes and buildings plus their surroundings. Functions of the system are for example: switching, open loop controlling, closed loop controlling, monitoring and supervising.

Note 2 to entry: This note applies to the French language only.

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[SOURCE: ISO/IEC 14762:2009, 3.1.10]

3.202

HBES switch
electronic switch intended to be used in an HBES system, used for two way communication and designed to make or break and/or to control, directly (e.g. actuator) or indirectly (e.g. sensor), the current in one or more electric circuits

Note 1 to entry: The communication can use different media e.g. Twisted Pair (TP), Power Line (PL), Infra-Red (IR) and Radio Frequency (RF).

Note 2 to entry: To make or break and/or to control directly means that an actuator makes or breaks the current and/or controls the current.

3.203
ELV
extra-low voltage
for the purpose of this standard, a voltage not exceeding 50 V a.c. or d.c. between conductors, or in the case of three-phase circuits, not exceeding 29 V between conductors and neutral, the no-load voltage of the circuit not exceeding 50 V and 29 V, respectively

Note 1 to entry: The use of ELV other than for protection by SELV or PELV in such circuits is not a protective measure.

3.204
FELV
functional extra-low voltage circuit
electrical circuit in which the voltage cannot exceed ELV used for functional purposes and having simple separation from LV.

Note 1 to entry: FELV does not fulfil the requirements for SELV (or PELV).

Note 2 to entry: A FELV circuit is not safe to touch and may be connected to protective earth.

3.205
SELV system
safety extra-low-voltage system
electrical system in which the voltage cannot exceed ELV

– under normal conditions
– under single fault conditions, including earth faults in other circuits

[SOURCE: IEC 61140:2001, 3.26.1]

3.206
PELV system
protected extra-low-voltage system
electrical system in which the voltage cannot exceed ELV

– under normal conditions
– under single fault conditions, except earth faults in other circuits

[SOURCE: IEC 61140:2001, 3.26.2]

3.207
simple separation
separation between circuits or between a circuit and earth by means of basic insulation

[SOURCE: IEC 61140:2001, 3.23]

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3.208
protective separation
separation of one electric circuit from another by means of

– double insulation, or
– basic insulation and protective screening, or
– reinforced insulation

[SOURCE: IEC 60050-195, Amendment 1:2001, 195-06-19]

3.209
basic insulation
insulation of hazardous-live-parts which provides basic protection

Note 1 to entry: This concept does not apply to insulation used exclusively for functional purposes.

[SOURCE: IEC 60050-195:1998, 195-06-06]

3.210
supplementary insulation
independent insulation applied in addition to basic insulation, for fault protection

[SOURCE: IEC 60050-195:1998, 195-06-07]

3.211
double insulation
insulation comprising both basic insulation and supplementary insulation

[SOURCE: IEC 60050-195:1998, 195-06-08]

3.212
reinforced insulation
insulation of hazardous-live-parts which provides a degree of protection against electric shock equivalent to double insulation

Note 1 to entry: Reinforced insulation may comprise several layers which cannot be tested singly as basic insulation or supplementary insulation

[SOURCE: IEC 60050-195:1998, 195-06-09]

4 General requirements

Clause 4 of IEC 60669-1:1998 and its Amendment 1:1999 and Amendment 2:2006 is applicable.

5 General notes on tests

Clause 5 of IEC 60669-2-1:2002 and its Amendment 1:2008 applies, except as follows:

5.4 *Replacement in Table 101 of the number of specimens in the column "*Additional specimens for clause or subclause 26*" from* 3 *and* 6 *to* 1 *and* 1.

6 Rating

Clause 6 of IEC 60669-2-1:2002 and its Amendment 1:2008 applies, except as follows:

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Addition:

For this standard the ELV is limited to 50 V a.c. and 50 V d.c.

NOTE For three phase circuits, see 3.203.

7 Classification

Clause 7 of IEC 60669-2-1:2002 and its Amendment 1:2008 applies, except as follows:

7.1.5 *Replacement:*

7.1.5 *Addition*:

– touch;
– proximity;
– optical;
– acoustic;
– other external influences, e.g. communication system.

NOTE Actuating the electronic switch includes on/off operation, and/or regulating the brightness of lamps or speed of motors.

Additions:

7.1.7 *Replacement:*

7.1.7 Not applicable for SELV switches.

7.1.8 *Replacement:*

7.1.8 according to the wiring connection:

– switches with screw-type terminals;
– switches with screwless terminals for rigid conductors only;
– switches with screwless terminals for rigid and flexible conductors;
– switches without terminals equipped with connecting leads.

7.1.101 *Addition of the following dashed item:*

– load for heating installations (e.g. resistive load, a motor load with a power factor not less than 0,6 or a combination of both);

Additional subclauses:

7.1.201 according to the presence of SELV or PELV part:

– switches with SELV or PELV parts only,
– switches without SELV or PELV parts,
– switches having a combination of parts connected to the mains and SELV or PELV parts.

7.1.202 according to the installation environment:

– switches intended to be used in SELV/PELV environment only;
– switches intended to be used in SELV/PELV and/or mains environment.

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7.1.203 according to the connection to the network port based on SELV/PELV:

a) Connected to a network which is installed wholly within the same equipotential earthing system;

b) Connected to a network which is not installed wholly within the same equipotential earthing system.

8 Marking

Clause 8 of IEC 60669-2-1:2002 and its Amendment 1:2008 is applicable, with the following exceptions:

8.1 *Replacement of the penultimate paragraph starting with "*For general purpose electronic switches with included automatic function*" by:*

In addition, for HBES switches with contact mechanism(s) classified for more than 20 000 operating cycles, the number of operating cycles shall be indicated. This information may be put on the HBES switch and/or on the packaging unit and/or on the accompanying instruction sheet.

Sensors, actuators and associated electronic extension units which do not control directly the load and which are supplied by the network do not need the following markings:

– rated voltage in volts;

– rated current in amperes or rated load in volt-amperes or watts;

– symbol for nature of supply;

The correct installation of the product shall be provided in the manufacturer's instructions.

8.4 *Addition, at the end of the subclause, of the following paragraph:*

If switched circuits cannot be used in SELV/PELV circuits, the relevant information shall be provided in the manufacturer's instructions.

9 Checking of dimensions

Clause 9 of IEC 60669-2-1:2002 and its Amendment 1:2008 applies.

10 Protection against electric shock

Clause 10 of IEC 60669-2-1:2002 and its Amendment 1: applies, except as follows:

Additional subclauses:

10.201 Live parts of SELV, PELV or FELV circuits shall be electrically separated from each other and from other circuits by simple or protective separation as given in Clause 23.

SELV / PELV is 50 V a.c. or d.c. maximum under no fault and one single fault condition.

FELV is 50 V a.c. or d.c. maximum under no fault.

In addition, if the SELV / PELV is higher than 25 V a.c. in dry conditions or 12 V a.c. or 30 V d.c. in wet conditions, protection against direct contact shall be provided by:

– barriers or enclosures giving at least the degree of protection IP2X or IPXXB, or

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– insulation capable of withstanding a test voltage of 500 V a.c. for 1 min.

Compliance is checked by inspection and the tests of Clauses 16 and 23.

10.202 Protection from touch current

NOTE For an explanation on touch current, see IEC 60950-1:2005 Annex W.

10.202.1 Permissible touch current when touching accessible parts of HBES switches

The touch current of HBES switches shall not be higher than 0,5 mA r.m.s. (0,7 mA peak) even during single fault condition.

Compliance is checked by inspection and if necessary by tests according to IEC 60990.

10.202.2 Limitation of the touch current from the device to the dedicated HBES network

The touch current to the HBES network from HBES switches supplied from the mains supply, or from interfaces to other networks, shall be limited to 0,25 mA r.m.s.

Compliance is checked by measurement according to IEC 60990.

This test does not apply to HBES switches where the circuit to be connected to the HBES network is connected to the protective or functional earthing terminal in the HBES switch. In this case the touch current from the HBES switch to the network is considered to be zero.

NOTE When it is possible to touch the HBES network during maintenance, the limitation of the summation of touch current can be considered in accordance to IEC 60950-1.

11 Provision for earthing

Clause 11 of IEC 60669-2-1:2002 and its Amendment 1:2008 applies.

12 Terminals

Clause 12 of IEC 60669-1:1998 and its Amendment 1:1999 and Amendment 2:2006 applies, except as follows:

12.1 *Addition after the first paragraph:*

The connecting capability of terminals for circuits other than those of the main circuit need not be related to the rated current of the HBES switch. This means that these terminals need not necessarily to have the same connecting capability as the mains terminals of the HBES switch. Terminals for conductors smaller than 0,5 mm^2 shall fulfil the requirements of IEC 60999-1.

Addition after the third paragraph:

Terminals having screw clamping which are in compliance with IEC 60998-2-1 can be used.

Addition before the last paragraph:

Terminals having screw clamping complying with IEC 60998-2-1 are considered to be in compliance with the requirements and tests of 12.2, except those of 12.2.6, 12.2.7 and 12.2.8, provided they are chosen according to Table 2.

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Feb 2023

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