SLOVENSKI STANDARD
SIST EN 60669-2-1:1997

01-november-1997

Switches for household and similar fixed-electrical installations - Part 2: Particular requirements - Section 1: Electronic switches (IEC 669-2-1:1994 + A1:1994 + A2:1995, modified)

Switches for household and similar fixed-electrical installations -- Part 2: Particular requirements -- Section 1: Electronic switches

Schalter für Haushalt und ähnliche ortsfeste elektrische Installationen -- Teil 2: Besondere Anforderungen -- Hauptabschnitt 1: Elektronische Schalter

Interrupteurs pour installations électriques fixes domestiques et analogues -- Partie 2: Prescriptions particulières -- Section 1: Interrupteurs électroniques

Ta slovenski standard je istoveten z: **EN 60669-2-1:1996**

ICS:

29.120.40 Stikala Switches

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Descriptors: Electrical installation, home electrical installation, switches, electronic equipment, detail specifications, classifications, marking, dimensional measurements, protection against electric shocks, temperature rise, equipment specifications, make capacity, break capacity performance evaluation, radio disturbances

English version

Switches for household and similar fixed-electrical installations
Part 2: Particular requirements
Section 1: Electronic switches
(IEC 669-2-1:1994 + A1:1994 + A2:1995, modified)

Interrupteurs pour installations électriques fixes domestiques et analogues
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Schalter für Haushalt und ähnliche ortsfeste elektrische Installationen
Teil 2: Besondere Anforderungen
Hauptabschnitt 1: Elektronische Schalter
(IEC 669-2-1:1994 + A1:1994 + A2:1995, modifiziert)

This European Standard was approved by CENELEC on 1996-07-02. 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 Central Secretariat 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 Central Secretariat has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

CENELEC
European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung
Central Secretariat: rue de Stassart 35, B - 1050 Brussels

Foreword

The text of the International Standard IEC 669-2-1:1994, prepared by SC 23B, Plugs, socket-outlets and switches, of IEC TC 23, Electrical accessories, together with common modifications prepared by the Technical Committee CENELEC TC 23B, Switches for household and similar fixed electrical installations, was submitted to the formal vote and was approved by CENELEC as EN 60669-2-1 on 1996-07-02.

The text of amendments 1:1994 and 2:1995 to the International Standard IEC 669-2-1:1994, prepared by the same SC 23B of IEC TC 23, together with common modifications prepared by the Technical Committee CENELEC TC 23B, was submitted to the Unique Acceptance Procedure and was approved by CENELEC for inclusion in EN 60669-2-1 on 1996-07-02.

The following dates were fixed:

- latest date by which the EN has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 1997-03-01
- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 2007-03-01

For products which have complied with the relevant national standard before 2007-03-01, as shown by the manufacturer or by a certification body, this previous standard may continue to apply for production until 2012-03-01.

Annexes designated "normative" are part of the body of the standard.
Annexes designated "informative" are given for information only.
In this standard, annexes ZA (Normative references) and ZB (Special national conditions) are normative and annexes AA and ZC (corrigendum to IEC 669-2-1:1994) are informative.
Annexes ZA, ZB and ZC have been added by CENELEC.

Endorsement notice

The text of the International Standard IEC 669-2-1:1994 and its amendments 1:1994 and 2:1995 was approved by CENELEC as a European Standard with agreed common modifications as given below.

COMMON MODIFICATIONS

1 Scope

Replace in the 3rd line of the 3rd paragraph "e.g. heating installations" by "e.g. heating controls".

Delete in the first line of the 4th paragraph the word "intentionally"

Add after the 4th paragraph the following:
This standard also applies to electronic switches where the operation or control is made by physical means, e.g. light, wind velocity, presence of persons, etc.

Add to Note 1 "or EN 61058-1"

2 Normative references

Replace the text of clause 2 by:

Note - Normative references to international publications are listed in Annex ZA (normative)

3 Definitions

3.105 **Replace** in the second dashed text of note 2 (of amendment 2) the words "after zero crossing half-wave" by "after zero crossing in each half-wave".

3.108 **Delete** at the end:
"via electronic components"

3.109 **Replace** the words "from a remote position" by "from a distance"

5 General notes on tests

Replace the text of this clause by:

This clause of part 1 applies with the following modifications and additions:

5.4 **Add** the following sentence:
The number of test specimens is shown in table 101.

Replace the second paragraph of part 1 by the following two paragraphs:

Three specimens are subjected to all the relevant tests, except for the tests of 18.2 and 19.1 where one further set of three specimens is used (or two further sets for switches of pattern number 2), and the tests of clause 24 where another three specimens are used.

For each test sequence of clause 26 and 104 three new specimens are used as shown in table 101.

Table 101

Type of switch	Number for general tests	Additional clause or subclause				
		18.2	19.1	24	26	104
Marked with one rated current and: - one voltage - two voltages	3 6	3[1)] 6[1)]	3[1)] 6[1)]	3 6	3 6	3 6
1)For electronic switches with mechanical and electromechanical switching devices, only the complete contact mechanism may be submitted.						

NOTE1
For checking compliance with the EMC requirements only the tests of clause 26 have to be carried out.

NOTE 2
The manufacturer may submit the same set of specimens to one or more test sequences as an alternative to the table , provided all the tests are carried out on one set of three specimens.

6 Rating

6.2 **Replace** the text by:
This sub-clause of part 1 does not apply.

6.3 **Add** the new following sub-clause:
The preferred rated supply frequencies are 50 Hz and/or 60 Hz.

8 Marking

8.6.101 **Delete** this sub-clause

10 Protection against electric shock

10.2 **Add** before the 1st paragraph:
"For touch sensitive switches the associated protective impedance does not have to comply with the requirements of clauses 16 to 23.

Replace the second paragraph by:
The protective impedance shall consist of at least two resistors or independent capacitors in series, or a combination of both, of the same nominal value. These resistors shall comply with the requirements given in 105.3, and the capacitors shall comply with the requirements given in 105.2

Delete the last paragraph.

10.101 **Add** the following new paragraph:

Compliance is checked with the standard test finger as shown in figure 2 in EN 60669-1.

13 Constructional requirements

13.101 **Delete** this sub-clause

16 Insulation resistance and electric strength

16.2 **Add** after the first paragraph of part 1:

Insulation resistance and electric strength are measured with the protective impedances according to 10.2 disconnected.

17 Temperature rise

Replace in the 6th paragraph "table 2" by "table 14"

Add in the 7th paragraph after the words "incandescent lamps" the words "for the public supply voltage".

Replace the 8th paragraph and Note 1 by :

Electronic switches for motors are loaded in accordance with the manufacturer's instructions. The rated load shall be determined with the electronic switch short-circuited.

Other electronic switches are loaded with the types of load as stated in the manufacturer's instructions. The rated load shall be determined with the electronic switch short-circuited.

Replace the 9th paragraph by the following two paragraphs:

In the case of motor speed controls the electronic switches are loaded until steady-state temperature at a voltage between 0,9 and 1,1 times rated voltage is reached, whichever is more unfavourable.

For other electronic switches the test is carried out at 1,1 times the rated voltage.

Replace in the last sentence before table 102 the reference *"clause 18, 19.1 and 104.1"* by *" 105.2, 105.3 and 105.4.1"*

Replace in table 102, the fourth row, the description of winding wires and relevant temperature rises by:

	Clause 17	Clause 104
Windings (Note 4)		
Class A	75	115
Class E	90	130
Class B	95	140
Class F	115	155
Class H	140	175
Class 200	160	195
Class 220	180	215
Class 250	210	245

Replace Note 1 in table 102 by:

1 - For areas not likely to be touched in normal use, temperature rises up to 75 K are allowed under normal operating conditions.

18 Making and breaking capacity

Add the following notes after the first paragraph:

NOTE 1

Where the term "switch" is used in Part 1, this term is replaced by "contact mechanism" as appropriate.

NOTE 2

In the case of switches using relays, the relay is operated at the specific rate of operation with the appropriate loads as in normal use.

Replace in the 6th paragraph:

"separate" by *"new"*.

Add after the 7th paragraph the following note:

NOTE 3

For electronic switches (e.g. passive infra-red, time delay switches, etc) whose cycle of operation is limited by their application, the rate of operation during the tests may be specified by the manufacturer.

18.102 **Replace** in the first paragraph (of amendment 2) the words "Electronic switches" by:
"The electronic switch for the control of the voltage of iron core transformers".

19 Normal operation

19.1 **Replace** in the second paragraph *"separate"* by *"new"*.

Add after the 3rd paragraph the following note:

NOTE - For electronic switches (e.g. passive infra-red, time delay switches, etc) whose cycle of operation is limited by their application, the rate of operation during the tests may be specified by the manufacturer.

Add at the end of the 8th paragraph: *"if applicable"*.

19.3 **Replace** the second paragraph by:

The electronic switch is loaded with its rated load and the voltage is then increased to 1,1 times the rated voltage, the setting is altered 10.000 times over the whole range from minimum to maximum and back to minimum by means of its control unit, the rate of operation being between 10 and 15 operations per minute.

Add the following note:

NOTE - Mechanical control units are push buttons, potentiometers, etc. requiring a manual operation.

19.4 **Add** at the end the following paragraph:

During the test, the electronic switch shall function correctly.

23 Creepage distances, clearances and distances through sealing compound

Add the following note before the last but one paragraph:

NOTE - An associated fuse, a directly associated fuse and current limiting means are devices inserted in the circuit whose primary function is to protect the electronic switch.

26 EMC requirements

Replace the text of this entire clause (as given in amendment 1) by:

Replace this clause of part 1 by the following:

Electronic switches shall be designed to operate correctly under the conditions of the electromagnetic environment in which they are intended to be used. This applies particularly to electronic switches intended to be connected to a.c. low voltage public supply systems where the design shall take into account the normal disturbances on a.c. supply systems as defined by the compatibility levels given in IEC 1000-2-2.

Electronic switches shall be designed so that the switch state (ON or OFF) and/or the setting are protected against interference.

Compliance is checked by the tests of 26.1and 26.2

NOTE - Measured values within the test limits are acceptable for the test results until the situation on uncertainty of measurement is clarified by the TC 210.

26.1 Immunity

For the following tests, the electronic switch is mounted as in normal use and is loaded as specified in clause 17, so that at rated voltage the rated load will be obtained.

Each electronic switch is tested, if applicable, in the following states:

a) in the ON state, highest setting;
b) in the ON state, lowest setting;
c) in the OFF state, highest setting;
d) in the OFF state, lowest setting.

26.1.1 Voltage dips and short interruptions

The electronic switch shall be tested using the test equipment specified in IEC 1000-4-11 in accordance with table 103 with a sequence of three dips/interruptions with intervals of 10 s minimum (between each test event).

Abrupt changes in supply voltage shall occur at zero crossings. The output impedance of the test voltage generator shall be low, even during the transition.

The change between the test voltage U_T and the changed voltage is abrupt.

NOTE 100 % U_T is equal to the rated voltage

A test level of 0% corresponds to a total supply voltage interruption.

Table 103

Test level %U_T	Voltage Dips/interruptions %U_T	Duration (number of cycles at rated frequency)
0	100	10
40	60	10
70	30	10

During this test the electronic switch state and/or setting may alter.

Occasional flickering of lamps or irregular running of motors during the test is neglected.

After the test the electronic switch shall be in the original switch state and the setting shall be unchanged.

26.1.2 Surge immunity test (1,2/50 μs wave impulses)

The electronic switch shall be tested for resistance to unidirectional surges caused by overvoltages from switching and lightning transients .

The test is carried out according to IEC 1000-4-5 applying ten times, each 30s ±5s, an open circuit test voltage of 1 kV (level 2).

During the test the switch state and/or the setting shall not alter. Occasional flickering of lamps or irregular running of motors during the test is neglected.

After the test the electronic switch shall be in the original switch state and the setting shall be unchanged.

26.1.3 Electrical fast transient test

The electronic switch shall be tested for resistance to repetitive fast transients (bursts) on the supply and control terminals /terminations.

The test is carried out according to IEC 1000-4-4 with the following specification:

The level of the repetitive fast transients consisting of bursts coupled into the supply and control terminals/terminations of the electronic switch is in accordance with table 104.

Table 104

Open circuit output test voltage ± 10 %	
Supply terminals/terminations	Control terminals/terminations
1 kV	0,5 kV

Both polarities of the test voltage are mandatory.

The duration of the test shall be not less than 1 min.

During the test the electronic switch state and/or setting may alter.

Occasional flickering of lamps or irregular running of motors during the test is neglected.

After the test, the electronic switch shall be in the original switch state and the setting shall be unchanged.

Note - If any change in the setting occurs, it should be possible to restore the setting by operation of the control(s).

26.1.4 Electrostatic discharge test

The electronic switch mounted as in normal use shall withstand electrostatic contact and air discharges.

The test is carried out according to IEC 1000-4-2 by applying one positive and one negative discharges of both types (air/contact), if necessary, to each of 10 preselected points designated by the manufacturer.

The following levels apply:

- test voltage of contact discharge: 4 kV
- test voltage of air discharge: 8 kV.

During the test, the electronic switch state and/or setting may alter.

Occasional flickering of lamps or irregular running of motors during the test is neglected.

After the test the electronic switch shall be in its original switch state and the setting shall be unchanged.

NOTE1

If any change in the setting occurs, it should be possible to restore the setting by operation of the control(s).

NOTE 2

Certain electronic switches (e. g. passive infrared switches - PIR switches) with adjustable time delay should be adjusted in such a way that the delay time is higher than the testing time.

26.1.5 Radiated electromagnetic field test

The electronic switch shall be tested for resistance to electromagnetic fields such as those generated by portable radio transceivers or any other device that will generate continuous wave radiated electromagnetic energy.

The test is carried out according to IEC 1000-4-3 applying a field strength of 3 V/m.

NOTE - The test specification is given in ENV 50140.

During the test the electronic switch state and/or setting may alter.

Occasional flickering of lamps or irregular running of motors during the test is neglected.

After the test the electronic switch shall be in the original switch state and the setting shall be unchanged.

Note - A revision of this test is under consideration.

26.2 Emission

26.2.1 Low-frequency emission.

Electronic switches with power up to 1 kW intended to be connected to the public low voltage supply system shall be so designed that they do not cause excessive disturbances in this network.

Requirements are deemed to be met if the electronic switch complies with IEC 1000-3-2.

For harmonics of the order above 11 an overview of the spectrum is taken.

If this overview shows an envelope of the spectrum with a monotonical decrease according to the increasing order of harmonics, measurements can be restricted to harmonics up to order 11.

NOTE - Requirements for electronic switches with a power above 1 kW are under consideration.

26.2.2 Radio-frequency emission

Electronic switches shall be so designed that they do not cause excessive radio interference.

The requirement is deemed to be met if the electronic switch complies with EN 55014 requirements.

104 Abnormal conditions

104.1.1.1 **Add** in the 6th paragraph *"approximately"* before *"2 min"*.

Delete the last two paragraphs.

105 Components

105.4.1.1 **Replace** the second dashed text by:

- For cut-outs in electronic switches for fluorescent lamps, the tests shall be carried out in the same way as for electronic switches for incandescent lamps.

105.4.1.2 **Replace** the explanation by the following test specification :

For cut-outs in electronic switches for fluorescent lamps, the tests shall be carried out in the same way as for electronic switches for incandescent lamps.

Annex ZA (normative)

Normative references to international publications with their corresponding European publications

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

NOTE: When an international publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

Publication	Year	Title	EN/HD	Year
-	-	Electromagnetic compatibility - Basic immunity standard - Radiated, radio-frequency electromagnetic field - Immunity test	ENV 50140[1)]	1993
IEC 65 (mod) + A1 (mod) + A2 (mod) + A3 (mod)	1985 1987 1989 1992	Safety requirements for mains operated electronic and related apparatus for household and similar general use	EN 60065 + corr. November	1993 1993
IEC 85	1984	Thermal evaluation and classification of electrical insulation	HD 566 S1	1990
IEC 127	1974	Cartridge fuse-links for miniature fuses	HD 109 S3[2)]	1983
IEC 317-0-1	1990	Specifications for particular types of winding wires -- Part 0: General requirements -- Section 1: Enamelled round copper wire	EN 60317-0-1[3)]	1994
IEC 730 (mod)	series	Automatic electrical controls for household and similar use	EN 60730	series
IEC 1000-2-2 (mod)	1990	Electromagnetic compatibility (EMC) Part 2: Environment -- Section 2: Compatibility levels for low-frequency conducted disturbances and signalling in public low-voltage power supply systems	ENV 61000-2-2	1993
IEC 1000-3-2	1995	Part 3: Limits -- Section 2: Limits for harmonic current emissions (equipment input current up to and including 16 A per phase)	EN 61000-3-2 A12	1995 1996

1) ENV 50150 will be replaced by EN 61000-4-3:1996 on 1997-06-01.

2) HD 109 S3 is superseded by the EN 60127 series, which is based on the new IEC 127 series, Miniature fuses.

3) EN 60317-0-1 is based on IEC 317-0-1:1990 + corr. March 1991 + A1:1992.

Publication	Year	Title	EN/HD	Year
IEC 1000-4-2	1995	Part 4: Testing and measurement techniques -- Section 2: Electrostatic discharge immunity test	EN 61000-4-2	1995
IEC 1000-4-3 (mod)	1995	Section 3: Radiated, radio-frequency, electromagnetic field immunity test	EN 61000-4-3	1996
IEC 1000-4-4	1995	Section 4: Electrical fast transient/burst immunity test	EN 61000-4-4	1995
IEC 1000-4-5	1995	Section 5: Surge immunity test	EN 61000-4-5	1995
IEC 1000-4-11	1994	Section 11: Voltage dips, short interruptions and voltage variations immunity tests	EN 61000-4-11	1994
IEC 1058-1	1990	Switches for appliances -- Part 1: General requirements	EN 61058-1	1992
CISPR 14	1993	Limits and methods of measurement of radio disturbance characteristics of electrical motor-operated and thermal appliances for household and similar purposes, electric tools and similar electric apparatus	EN 55014	1993
ISO 306	1974	Plastics - Determination of the Vicat softening temperature of thermoplastics	-	-