



SLOVENSKI STANDARD
SIST EN 60947-2:1998/A2:2002
01-februar-2002

B]n_cbUdYrcglbY`ghj_UbY`]b`_fa]bY`bUdfUj Y`È&`"XY.`CX_`cdb]_]`È'8cdc`b]c`5 &È
GdfYa Ya VUj Y `dcXfUhXY`_cj `]b`XcXUHy`_`@

Low-voltage switchgear and controlgear -- Part 2: Circuit-breakers

Niederspannungsschaltgeräte -- Teil 2: Leistungsschalter

Appareillage à basse tension -- Partie 2: Disjoncteurs

STANDARD PREVIEW
(standards.iteh.ai)

Ta slovenski standard je istoveten z: EN 60947-2:1996/A2:2001

<https://standards.iteh.ai/catalog/standards/sist/036fee50-8179-46b4-b6a7-e5cbac699d5d/sist-en-60947-2-1998-a2-2002>

ICS:

29.130.20	Nizkonapetostne stikalne in krmilne naprave	Low voltage switchgear and controlgear
-----------	---	--

SIST EN 60947-2:1998/A2:2002 **en**

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[SIST EN 60947-2:1998/A2:2002](https://standards.iteh.ai/catalog/standards/sist/036fee50-8179-46b4-b6a7-e5cbae699d5d/sist-en-60947-2-1998-a2-2002)

<https://standards.iteh.ai/catalog/standards/sist/036fee50-8179-46b4-b6a7-e5cbae699d5d/sist-en-60947-2-1998-a2-2002>

EUROPEAN STANDARD

EN 60947-2/A2

NORME EUROPÉENNE

EUROPÄISCHE NORM

August 2001

ICS 29.130.20

English version

Low-voltage switchgear and controlgear
Part 2: Circuit-breakers
(IEC 60947-2:1995/A2:2001)Appareillage à basse tension
Partie 2: Disjoncteurs
(CEI 60947-2:1995/A2:2001)Niederspannungsschaltgeräte
Teil 2: Leistungsschalter
(IEC 60947-2:1995/A2:2001)

This amendment A2 modifies the European Standard EN 60947-2:1996; it was approved by CENELEC on 2001-07-01. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this amendment the status of a national standard without any alteration.

(standards.iteh.ai)

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 amendment 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, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

CENELECEuropean 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 document 17B/1135/FDIS, future amendment 2 to IEC 60947-2:1995, prepared by SC 17B, Low-voltage switchgear and controlgear, of IEC TC 17, Switchgear and controlgear, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as amendment A2 to EN 60947-2:1996 on 2001-07-01.

The following dates were fixed:

- latest date by which the amendment has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2002-04-01
- latest date by which the national standards conflicting with the amendment have to be withdrawn (dow) 2004-07-01

Annexes designated "normative" are part of the body of the standard.
In this standard, annex ZA is normative.
Annex ZA has been added by CENELEC.

Endorsement notice

The text of amendment 2:2001 to the International Standard IEC 60947-2:1995 was approved by CENELEC as an amendment to the European Standard without any modification.

[SIST EN 60947-2:1998/A2:2002](https://standards.iteh.ai/catalog/standards/sist/036fee50-8179-46b4-b6a7-e5cbae699d5d/sist-en-60947-2-1998-a2-2002)
<https://standards.iteh.ai/catalog/standards/sist/036fee50-8179-46b4-b6a7-e5cbae699d5d/sist-en-60947-2-1998-a2-2002>

Annex ZA (normative)

Normative references to international publications with their corresponding European publications

Add:

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 60068-2-14	1984	Environmental testing Part 2: Tests - Test N: Change of temperature	EN 60068-2-14	1999
IEC 60695-2-1/0	1994	Fire hazard testing Part 2: Test methods -- Section 1/ sheet 0: Glow-wire test methods - General	EN 60695-2-1/0 ¹⁾	1996
IEC 60695-2-1/1 + corr. May	1994 1995	Part 2: Test methods -- Section 1/ sheet 1: Glow-wire end-product test and guidance	EN 60695-2-1/1 ²⁾	1996
IEC 60695-2-1/2	1994	Part 2: Test methods -- Section 1/ sheet 2: Glow-wire flammability test on materials	EN 60695-2-1/2 ³⁾	1996
IEC 60695-2-1/3	1994	Part 2: Test methods -- Section 1/ sheet 3: Glow-wire ignitability test on materials	EN 60695-2-1/3 ⁴⁾	1996
IEC 61000-3-2 (mod)	2000	Electromagnetic compatibility (EMC) Part 3-2: Limits - Limits for harmonic current emissions (equipment input current up to and including 16 A per phase)	EN 61000-3-2	2000
IEC 61000-3-3	1994	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	EN 61000-3-3 + corr. July	1995
IEC 61000-5-2	1997	Part 5: Installation and mitigation guidelines -- Section 2: Earthing and cabling	-	-

1) EN 60695-2-1/0 is superseded by EN 60695-2-10:2001 (IEC 60695-2-10:2000).

2) EN 60695-2-1/1 is superseded by EN 60695-2-11:2001 (IEC 60695-2-11:2000).

3) EN 60695-2-1/2 is superseded by EN 60695-2-12:2001 (IEC 60695-2-12:2000).

4) EN 60695-2-1/3 is superseded by EN 60695-2-13:2001 (IEC 60695-2-13:2000).

EN 60947-2:1996/A2:2001

- 4 -

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
CISPR 11 (mod)	1997	Industrial, scientific and medical (ISM) radio-frequency equipment - Radio disturbance characteristics - Limits and methods of measurement	EN 55011	1998
CISPR 22 (mod)	1997	Information technology equipment - Radio disturbance characteristics - Limits and methods of measurement	EN 55022 + corr. July	1998 2001

iTeh STANDARD PREVIEW (standards.iteh.ai)

[SIST EN 60947-2:1998/A2:2002](https://standards.iteh.ai/catalog/standards/sist/036fee50-8179-46b4-b6a7-e5cbae699d5d/sist-en-60947-2-1998-a2-2002)

<https://standards.iteh.ai/catalog/standards/sist/036fee50-8179-46b4-b6a7-e5cbae699d5d/sist-en-60947-2-1998-a2-2002>

NORME
INTERNATIONALE
INTERNATIONAL
STANDARD

CEI
IEC

60947-2

1995

AMENDEMENT 2
AMENDMENT 2
2001-07

Amendement 2

Appareillage à basse tension –

Partie 2:
Disjoncteurs

STANDARD PREVIEW
(standards.iteh.ai)

Amendment 2

SIST EN 60947-2:1998/A2:2002
<https://standards.iteh.ai/catalog/standards/sist-en-60947-2-1998-a2-2002/e5cbac699d5d/sist-en-60947-2-1998-a2-2002>
Low-voltage switchgear and controlgear –

**Part 2:
Circuit-breakers**

© IEC 2001 Droits de reproduction réservés — Copyright - all rights reserved

International Electrotechnical Commission
Telefax: +41 22 919 0300

3, rue de Varembé Geneva, Switzerland
e-mail: inmail@iec.ch

IEC web site <http://www.iec.ch>



Commission Electrotechnique Internationale
International Electrotechnical Commission
Международная Электротехническая Комиссия

CODE PRIX
PRICE CODE

XA

*For price, voir catalogue en vigueur
For price, see current catalogue*

FOREWORD

This amendment has been prepared by subcommittee 17B: Low-voltage switchgear and controlgear, of IEC technical committee 17: Switchgear and controlgear.

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

FDIS	Report on voting
17B/1135/FDIS	17B/1145/RVD

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

The committee has decided that the contents of the base publication and its amendments will remain unchanged until 2002. At this date, the publication will be:

- reconfirmed;
- withdrawn;
- replaced by a revised edition, or
- amended.

iTeh STANDARD PREVIEW (standards.iteh.ai)

[SIST EN 60947-2:1998/A2:2002](https://standards.iteh.ai/catalog/standards/sist/036fee50-8179-46b4-b6a7-e5cbac699d5d/sist-en-60947-2-1998-a2-2002)

Page 3

<https://standards.iteh.ai/catalog/standards/sist/036fee50-8179-46b4-b6a7-e5cbac699d5d/sist-en-60947-2-1998-a2-2002>

CONTENTS

Replace, in the title of annex F, the word "requirements" by the word "tests".

Add the title of the following new annex:

L Circuit-breakers not fulfilling the requirements for overcurrent protection

Page 13

1.2 Normative references

Replace "IEC 898:1987" by "IEC 60898".

Replace, on page 15, "IEC 934:1988" by "IEC 60934".

Replace, on page 15, "IEC 947-1:1988" by "IEC 60947-1:1999".

Add, on page 15, the following new references:

IEC 60068-2-14:1984, *Environmental testing – Part 2: Tests. Test N: Change of temperature*

IEC 60695-2-1/0:1994, *Fire hazard testing – Part 2: Test methods – Section 1/sheet 0: Glow-wire test methods – General*

IEC 60695-2-1/1:1994, *Fire hazard testing – Part 2: Test methods – Section 1/sheet 1: Glow-wire end-product test and guidance*

IEC 60695-2-1/2:1994, *Fire hazard testing – Part 2: Test methods – Section 1/sheet 2: Glow-wire flammability test on materials*

IEC 60695-2-1/3:1994, *Fire hazard testing – Part 2: Test methods – Section 1/sheet 3: Glow-wire ignitability test on materials*

IEC 61000-3-2:2000, *Electromagnetic compatibility (EMC) – Part 3-2: Limits – Limits for harmonic current emissions (equipment input current ≤ 16 A per phase)*

IEC 61000-3-3:1994, *Electromagnetic compatibility (EMC) – Part 3: Limits – Section 3: Limitation of voltage fluctuations and flicker in low-voltage supply systems for equipment with rated current ≤ 16 A*

IEC 61000-5-2:1997, *Electromagnetic compatibility (EMC) – Part 5: Installation and mitigation guidelines – Section 2: Earthing and cabling*

CISPR 11:1997, *Industrial, scientific and medical (ISM) radio-frequency equipment – Electromagnetic disturbance characteristics – Limits and method of measurement*

CISPR 22:1997, *Information technology equipment – Radio disturbance characteristics – Limits and method of measurement*

ST EN 60947-2:1998/A2:2002
<https://standards.iteh.ai/catalog/standards/sist/036fee50-8179-46b4-b6a7-e5cbac699d5d/sist-en-60947-2-1998-a2-2002>

Page 39

5.2 Marking

Replace in item a), second dashed item, the existing symbol by the following:



Replace, on page 41, in item c), the following dashed item:*

- suitability for environment 1 or environment 2, as applicable (see 7.3.1 of part 1).

by:

- suitability for environment A or environment B, as applicable.

* The modification refers to changes introduced in amendment 1.

Add, on page 41, in item c), the following new item:

- r.m.s. sensing, if applicable, according to F.4.1.1.

Page 43

7.1 Constructional requirements

Replace the existing text, including the note, by the following:

Subclause 7.1 of IEC 60947-1 applies except that the text of 7.1.1.1 is replaced by the following:

Parts of insulating materials which might be exposed to thermal stresses due to electrical effects and the deterioration of which might impair the safety of the equipment shall not be adversely affected by abnormal heat and fire.

Tests on equipment shall be made by the glow-wire tests of IEC 60695-2-1/0, IEC 60695-2-1/1, IEC 60695-2-1/2 and IEC 60695-2-1/3.

Parts of insulating materials necessary to retain in position current-carrying parts of the main circuit in service shall conform to the glow-wire test of 8.2.1.1.1 of IEC 60947-1, at a temperature of 960 °C.

Parts of insulating materials other than those specified in the previous paragraph shall conform to the requirements of the glow-wire tests of 8.2.1.1.1 of IEC 60947-1 at a temperature of 650 °C.

Add, on page 45, after subclause 7.1.5, the following new subclause 7.1.6:

7.1.6 Additional requirements for circuit-breakers provided with a neutral pole

Subclause 7.1.8 of IEC 60947-1 applies with the following addition:

If a pole with an appropriate making and breaking capacity is used as a neutral pole, then all poles, including the neutral pole, may operate substantially together.

Page 57

7.2.6 Switching overvoltages

Replace the existing title and text of this subclause by the following:

7.2.6 Vacant

7.3.1 General*

Replace the existing paragraph by the following:

NOTE Subclause 7.3.1 of IEC 60947-1 is presently under revision. In particular, environments 1 and 2 will be referred to as environments B and A respectively, to be in line with CISPR. This has been taken into consideration in this amendment.

* The modification refers to changes introduced in amendment 1.

Two sets of environmental conditions are considered and are referred to as follows:

- a) environment A;
- b) environment B.

Environment A: relates to low-voltage non-public or industrial networks/locations/installations including highly disturbing sources.

NOTE 1 Environment A corresponds to equipment class A in CISPR 11 and CISPR 22.

NOTE 2 Environment A equipment can cause electromagnetic disturbances when installed in environment B.

Environment B: relates to low-voltage public networks such as domestic, commercial and light industrial locations/installations. Highly disturbing sources such as arc welders are not covered by this environment.

NOTE 3 Environment B corresponds to equipment class B in CISPR 11 and CISPR 22.

NOTE 4 Environment B equipment will not cause electromagnetic disturbances when installed in environment A.

Page 85

8.3.3.1.1 General

Add, after the fourth paragraph, the following note:

NOTE For tests for which the tripping characteristic is independent of the temperature of the terminals (e.g. electronic overload releases, magnetic releases), connection data (type, cross-section, length) may be different from those required in 8.3.3.3.4 of IEC 60947-1. The connections should be compatible with the test current and induced thermal stresses.

[SIST EN 60947-2:1998/A2:2002](https://standards.iteh.ai/catalog/standards/sist/036fee50-8179-46b4-b6a7-e5cbac699d5d/sist-en-60947-2-1998-a2-2002)

Page 87

<https://standards.iteh.ai/catalog/standards/sist/036fee50-8179-46b4-b6a7-e5cbac699d5d/sist-en-60947-2-1998-a2-2002>

8.3.3.1.2 Opening under short-circuit conditions

Modify the second line of the penultimate paragraph as follows:

" ...the value of the tripping current declared by the manufacturer for a single pole, at which value they shall operate... "

Page 99

8.3.3.3.3 Operational performance capability without current

This correction applies to the French text only.

Page 101

8.3.3.4 Overload performance

Add, to the first paragraph, "1" after NOTE.

Add, after the fifth paragraph, the following note:

NOTE 2 If the testing means do not withstand the let-through energy occurring during the automatic operation, the test may be performed as follows, with the agreement of the manufacturer:

- 12 manual operations;
- three additional operations with automatic opening, made at any convenient voltage.

Page 103

8.3.3.5 Verification of dielectric withstand

Modify the beginning of the first paragraph to read:

"It shall be verified that the circuit-breaker is capable, without maintenance, of withstanding a voltage..."

8.3.4.2 Verification of operational capability*

Add, at the end of this subclause, the following new paragraph:

This verification need not be made where, for a given frame size, the test of 8.3.4.1 has been made on a circuit-breaker of minimum I_n or at the minimum overload release setting as specified in table 10.

iTech STANDARD PREVIEW
(standards.iteh.ai)

Page 109

SIST EN 60947-2:1998/A2:2002

8.3.5.1 Verification of overload releases

Add, to the first paragraph, "1" after NOTE.

Add, after the first paragraph and its NOTE 1, the following new note:

NOTE 2 For tests for which the tripping characteristic is independent of the temperature of the terminals (e.g. electronic overload releases, magnetic releases), connection data (type, cross-section, length) may be different from those required in 8.3.3.3.4 of IEC 60947-1. The connections should be compatible with the test current and induced thermal stresses.

Page 111

8.3.6.2 Test of rated short-time withstand current

Modify the beginning of the second paragraph to read:

"For the purpose of this test only, any over-current release, including ... "

* The addition refers to changes introduced in amendment 1.

Page 145

Annex B – Circuit-breakers incorporating residual current protection

Add, on page 159, to clause "B.5 Marking", item d), the following new dashed item:

- value of rated residual non-operating current $I_{\Delta no}$ if greater than $0,5 I_{\Delta n}$.

B.7.3 Verification of radio frequency emissions*

Replace the existing first paragraph by the following:

Subclause 7.3.3.2 of IEC 60947-1 applies. The CBR shall comply with the requirements of table 18 or table 19 of IEC 60947-1, as applicable.

Page 187

B.8.9.2 In case of voltage drop (classification under B.3.1.2.2.1)

Add, at the end of this subclause, the following note:

NOTE The revision of this subclause is under consideration.

Page 189

B.8.11 Verification of the effects of environmental conditions

Modify the beginning of the second paragraph to read:

"The upper temperature shall be $55\text{ °C} \pm 2\text{ °C}$ (variant 1) and the number ..."

B.8.14.1 Test for conducted radio-frequency emissions*

Replace the existing paragraph by the following:

A description of the test, the test method and the test arrangement are given in CISPR 11 or CISPR 22, as relevant.

* The modification refers to changes introduced in amendment 1.

Replace the existing annex F by the following new annex F:

Annex F (normative)

Additional tests for circuit-breakers with electronic over-current protection

F.1 Scope

This annex applies to circuit-breakers intended to be installed on a.c. circuits and providing over-current protection by electronic means, incorporated in the circuit-breaker and independent of the line voltage or any auxiliary supply.

The tests verify the performance of the circuit-breaker under the environmental conditions stated in this annex.

Specific tests for electronic means intended for functions other than over-current protection are not covered by this annex. However, the tests of this annex shall be performed to ensure that these electronic means do not impair the performance of the over-current protective functions.

[SIST EN 60947-2:1998/A2:2002](https://standards.iteh.ai/catalog/standards/sist/036fee50-8179-46b4-b6a7-e5cbac699d5d/sist-en-60947-2-1998-a2-2002)

<https://standards.iteh.ai/catalog/standards/sist/036fee50-8179-46b4-b6a7-e5cbac699d5d/sist-en-60947-2-1998-a2-2002>

F.2 List of tests

Tests specified in this annex are type tests and are supplementary to the tests of clause 8.

NOTE Where a standard for specific environmental conditions exists, reference is systematically made to this standard, if relevant.

F.2.1 Electromagnetic compatibility (EMC) tests

F.2.1.1 General

Circuit-breakers with electronic over-current protection shall be tested according to table F.1.

Table F.1 – EMC test requirements

Immunity tests				
Description	Reference basic standard	Test level	Test procedure	Performance criteria
Low-frequency tests				
Harmonic currents	^b	AC main circuit: according to F.4.1	F.4.1	A
Current dips	^c	AC main circuit: according to F.4.2	F.4.2	B ^f
High-frequency tests				
Electrostatic discharges (ESD)	IEC 61000-4-2	8 kV contact 8 kV air	F.4.3	B
Radiated electromagnetic fields	IEC 61000-4-3	10 V/m	F.4.4	A
Electrical fast transient/burst (EFT/B)	IEC 61000-4-4	AC main circuit: 4 kV Auxiliary ports ^a : 2 kV	F.4.5	A ^e
Surges (1,2/50 µs – 8/20 µs)	IEC 61000-4-5	AC main circuit: 4 kV line to earth; 2 kV line to line Auxiliary ports ^a : 2 kV line to earth; 1 kV line to line	F.4.6	B
Conducted disturbances induced by radio-frequency fields	IEC 61000-4-6	AC main circuit: 10 V Auxiliary ports ^a : 10 V	F.4.7	A
Emission tests				
Description	Reference standard	Limits	Test procedure	
Harmonics	IEC 61000-3-2	Not required (see F.5.1)		
Voltage fluctuations	IEC 61000-3-3	Not required (see F.5.2)		
Conducted RF 150 kHz to 30 MHz	CISPR 11/CISPR 22	Under consideration		
Radiated RF 30 MHz to 1 GHz ^d	CISPR 11/CISPR 22	Class A or class B, group 1 ^g	F.5.4	
<p>^a Auxiliary ports: ports intended to be connected to auxiliary devices such as shunt releases, undervoltage releases, communication modules, auxiliary switches and a.c.-d.c. ports intended to supply circuits performing auxiliary functions, i.e. not concerning the overload protection characteristics.</p> <p>^b Immunity test procedures regarding low-frequency phenomena are dealt with by other standards and test procedures dealing with harmonics are under consideration. For the time being, a specific test procedure is defined in this standard in the absence of a more general one.</p> <p>^c A specific test procedure is defined in this standard in the absence of an appropriate basic standard.</p> <p>^d Applicable only for circuit-breakers containing processing devices (e.g. microprocessors) or switched mode power supplies operating at frequencies greater than 9 kHz.</p> <p>^e See F.4.5.</p> <p>^f See F.4.2.2.</p> <p>^g See 7.3.1.</p>				