



**SLOVENSKI STANDARD**  
**SIST EN 60947-1:2007/A2:2015**  
**01-junij-2015**

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**Nizkonapetostne stikalne naprave - 1. del: Splošna pravila - Dopolnilo A2**

Low-voltage switchgear and controlgear - Part 1: General rules

Niederspannungsschaltgeräte - Teil 1: Allgemeine Festlegungen

Appareillage à basse tension - Partie 1: Règles générales

**Ta slovenski standard je istoveten z: EN 60947-1:2007/A2:2014**

[SIST EN 60947-1:2007/A2:2015](https://standards.iteh.ai/catalog/standards/sist/50e14428-7d95-48f9-a2fd-7b081059ddc9/sist-en-60947-1-2007-a2-2015)

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**ICS:**

29.130.20	Nizkonapetostne stikalne in krmilne naprave	Low voltage switchgear and controlgear
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**SIST EN 60947-1:2007/A2:2015**                      **en**

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EUROPEAN STANDARD  
NORME EUROPÉENNE  
EUROPÄISCHE NORM

**EN 60947-1:2007/A2**

November 2014

ICS 29.130.20

English Version

**Low-voltage switchgear and controlgear -  
Part 1: General rules  
(IEC 60947-1:2007/A2:2014)**

Appareillage à basse tension -  
Partie 1: Règles générales  
(CEI 60947-1:2007/A2:2014)

Niederspannungsschaltgeräte -  
Teil 1: Allgemeine Festlegungen  
(IEC 60947-1:2007/A2:2014)

This amendment A2 modifies the European Standard EN 60947-1:2007; it was approved by CENELEC on 2014-10-14. 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.

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.

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European Committee for Electrotechnical Standardization  
Comité Européen de Normalisation Electrotechnique  
Europäisches Komitee für Elektrotechnische Normung

**CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels**

## Foreword

The text of document 121A/15/FDIS, future IEC 60947-1:2007/A2, prepared by SC 121A "Low-voltage switchgear and controlgear" of IEC/TC 121 "Switchgear and controlgear and their assemblies for low voltage" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 60947-1:2007/A2:2014.

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) 2015-07-14
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2017-10-14

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

This document has been prepared under a mandate given to CENELEC by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive.

For the relationship with EU Directive see informative Annex ZZ, which is an integral part of this document.

This standard covers the Principle Elements of the Safety Objectives for Electrical Equipment Designed for Use within Certain Voltage Limits (LVD - 2006/95/EC).

[SIST EN 60947-1:2007/A2:2015](https://standards.iteh.ai/catalog/standards/sist/50e14428-7d95-48f9-a2fd-7b0810747422-2015)

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**Endorsement notice**

The text of the International Standard IEC 60947-1:2007/A2:2014 was approved by CENELEC as a European Standard without any modification.

In the Bibliography of EN 60947-1:2007, the following notes have to be **added** for the standards indicated:

IEC 60695-11-5	NOTE	Harmonized as EN 60695-11-5.
IEC 60947-3:2008	NOTE	Harmonized as EN 60947-3:2009 (not modified).
IEC 60947-3:2008/A1:2012	NOTE	Harmonized as EN 60947-3:2009/A1:2012 (not modified).
IEC 60947-4-1:2009	NOTE	Harmonized as EN 60947-4-1:2010 (not modified).
IEC 60947-4-1:2009/A1:2012	NOTE	Harmonized as EN 60947-4-1:2010/A1:2012 (not modified).
IEC 60947-4-2:2011	NOTE	Harmonized as EN 60947-4-2:2012 (not modified).
IEC 60947-4-3:1999	NOTE	Harmonized as EN 60947-4-3:2000 <sup>1)</sup> (not modified).
IEC 60947-4-3:1999/A1:2006	NOTE	Harmonized as EN 60947-4-3:2000/A1:2006 <sup>1)</sup> (not modified).
IEC 60947-4-3:1999/A2:2011	NOTE	Harmonized as EN 60947-4-3:2000/A2:2011 <sup>1)</sup> (not modified).
IEC 60947-5-2:2007	NOTE	Harmonized as EN 60947-5-2:2007 (not modified).
IEC 60947-5-2:2007/A1:2012	NOTE	Harmonized as EN 60947-5-2:2007/A1:2012 (not modified).
IEC 60947-6-1:2005	NOTE	Harmonized as EN 60947-6-1:2005 (not modified).
IEC 60947-6-1:2005/A1:2013	NOTE	Harmonized as EN 60947-6-1:2005/A1:2014 (not modified).

<sup>1)</sup> Superseded by EN 60947-4-3:2014 (IEC 60947-4-3:2014).

IEC 60947-6-2:2002	NOTE	Harmonized as EN 60947-6-2:2003 (not modified).
IEC 60947-6-2:2002/A1:2007	NOTE	Harmonized as EN 60947-6-2:2003/A1:2007 (not modified).
IEC 61095:2009	NOTE	Harmonized as EN 61095:2009 (not modified).
IEC 61439 Series	NOTE	Harmonized as EN 61439 Series (not modified).
IEC 61508-6	NOTE	Harmonized as EN 61508-6.
CISPR 22	NOTE	Harmonized as EN 55022.
ISO 50001	NOTE	Harmonized as EN ISO 50001.

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## Annex ZA (normative)

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

**Annex ZA of EN 60947-1:2007 applies, except as follows:**

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
<b>Delete from the Annex ZA of EN 60947-1:2007 "IEC 60439-1:1999 and its amendment A1:2004".</b>				

**Replace the existing references of the following list by the following new references:**

IEC 60664-1	2007	Insulation coordination for equipment within low-voltage systems - Part 1: Principles, requirements and tests	EN 60664-1	2007
IEC 61000-3-3	2013	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 $\leq 16$ A per phase and not subject to conditional connection	EN 61000-3-3	2013
IEC 61000-4-2	2008	Electromagnetic compatibility (EMC) - Part 4-2: Testing and measurement techniques - Electrostatic discharge immunity test	EN 61000-4-2	2009
IEC 61000-4-4	2012	Electromagnetic compatibility (EMC) - Part 4-4: Testing and measurement techniques - Electrical fast transient/burst immunity test	EN 61000-4-4	2012
IEC 61000-4-6	2013	Electromagnetic compatibility (EMC) - Part 4-6: Testing and measurement techniques - Immunity to conducted disturbances, induced by radio-frequency fields	EN 61000-4-6	2014
IEC 61000-4-8	2009	Electromagnetic compatibility (EMC) - Part 4-8: Testing and measurement techniques - Power frequency magnetic field immunity test	EN 61000-4-8	2010
CISPR 11 (mod) +A1	2009 2010	Industrial, scientific and medical equipment - Radio-frequency disturbance characteristics - Limits and methods of measurement	EN 55011 +A1	2009 2010

**Add, to the existing references the new amendments as follows:**

IEC 60947-5-1	2003	Low-voltage switchgear and controlgear - Part 5-1: Control circuit devices and switching elements - Electromechanical control circuit devices	EN 60947-5-1 + corr. November 2004 + corr. July 2005	2004 2004 2005
+A1	2009		+A1	2009
IEC 61000-3-2	2005	Electromagnetic compatibility (EMC) - Part 3-2: Limits - Limits for harmonic current emissions (equipment input current ≤ 16 A per phase)	EN 61000-3-2	2006
+A1	2008		+A1	2009
+A2	2009		+A2	2009
IEC 61000-4-3	2006	Electromagnetic compatibility (EMC) - Part 4-3: Testing and measurement techniques - Radiated, radio-frequency, electromagnetic field immunity test	EN 61000-4-3	2006
+A1	2007		+A1	2008
+A2	2010		+A2	2010
IEC 61000-4-13	2002	Electromagnetic compatibility (EMC) - Part 4-13: Testing and measurement techniques - Harmonics and interharmonics including mains signalling at a.c. power port, low frequency immunity tests	EN 61000-4-13	2002
+A1	2009		+A1	2009

**Add the following new references as follows:**

IEC 60092-504	2001	Electrical installations in ships - Part 504: Special features - Control and instrumentation	-	-
IEC 60300-3-5	2001	Dependability management - Part 3-5: Application guide - Reliability test conditions and statistical test principles	-	-
IEC 61508	Series	Functional safety of electrical/electronic/programmable electronic safety-related systems	EN 61508	Series
IEC 61649	2008	Weibull analysis	EN 61649	2008
IEC 62061	2005	Safety of machinery - Functional safety of safety-related electrical, electronic and programmable electronic control systems	EN 62061 + corr. February 2010	2005 2010
IEC 62430	2009	Environmentally conscious design for electrical and electronic products	EN 62430	2009
IEC 62474	2012	Material declaration for products of and for the electrotechnical industry	EN 62474	2012
ISO 13849-1	2006	Safety of machinery - Safety-related parts of control systems - Part 1: General principles for design	EN ISO 13849-1	2008

*Replace Annex ZZ by the following new one:*

**Annex ZZ**  
(informative)

**Coverage of Essential Requirements of EU Directives**

This European Standard has been prepared under a mandate given to CENELEC by the European Commission and the European Free Trade Association and within its scope the standard covers protection requirements of Annex I Article 1 of the EU Directive 2004/108/EC.

Compliance with this standard provides presumption of conformity with the specified essential requirements of the Directives concerned.

NOTE: Other requirements and other EU Directives may be applicable to the products falling within the scope of this standard.

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IEC 60947-1

Edition 5.0 2014-09

# INTERNATIONAL STANDARD

# NORME INTERNATIONALE



AMENDMENT 2  
AMENDEMENT 2

Low-voltage switchgear and controlgear –  
Part 1: General rules

**(standards.iteh.ai)**

Appareillage à basse tension –  
Partie 1: Règles générales

SIST EN 60947-1:2007/A2:2015  
<https://standards.iteh.ai/catalog/standards/sist/50e14428-7d95-48f9-a2fd-7b081059ddc9/sist-en-60947-1-2007-a2-2015>

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## 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
121A/15/FDIS	121A/21/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 this amendment and the base 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

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

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**IMPORTANT – The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.**

## 1.1 Scope and object

*Replace the existing text of this subclause by the following new text:*

This standard applies, when required by the relevant product standard, to low-voltage switchgear and controlgear hereinafter referred to as "equipment" or "device" and intended to be connected to circuits the rated voltage of which does not exceed 1 000 V a.c. or 1 500 V d.c.

This standard states the general rules and common safety requirements for low-voltage switchgear and controlgear, including:

- definitions;
- characteristics;
- information supplied with the equipment;
- normal service, mounting and transport conditions;
- constructional and performance requirements;
- verification of characteristics and performance;
- environmental aspects.

IEC 60947-1:2007/AMD2:2014  
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– 3 –

This standard does not apply to low-voltage switchgear and controlgear assemblies which are dealt with in IEC 61439 series, as applicable.

## 1.2 Normative references

*Delete the existing reference to "IEC 60439-1:1999" and its Amendment 1.*

*Replace the existing references by the following new references:*

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

IEC 61000-3-3:2013, *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  $\leq 16$  A per phase and not subject to conditional connection*

IEC 61000-4-2:2008, *Electromagnetic compatibility (EMC) – Part 4-2: Testing and measurement techniques – Electrostatic discharge immunity test*

IEC 61000-4-4:2012, *Electromagnetic compatibility (EMC) – Part 4-4: Testing and measurement techniques – Electrical fast transient/burst immunity test*

IEC 61000-4-6:2013, *Electromagnetic compatibility (EMC) – Part 4-6: Testing and measurement techniques – Immunity to conducted disturbances, induced by radio-frequency fields*

IEC 61000-4-8:2009, *Electromagnetic compatibility (EMC) – Part 4-8: Testing and measurement techniques – Power frequency magnetic field immunity test*

<https://standards.iteh.ai/catalog/standards/sist/50e14428-7d95-48f9-a2fd-312015>  
CISPR 11:2009, *Industrial, scientific and medical equipment – Radio-frequency disturbance characteristics – Limits and methods of measurement*  
Amendment 1 (2010)

*Add, to the existing references, the new amendments as follows:*

IEC 60947-5-1:2003, *Low-voltage switchgear and controlgear – Part 5-1: Control circuit devices and switching elements – Electromechanical control circuit devices*  
Amendment 1 (2009)

IEC 61000-3-2:2005, *Electromagnetic compatibility (EMC) – Part 3-2: Limits – Limits for harmonic current emissions (equipment input current  $\leq 16$  A per phase)*  
Amendment 1 (2008)  
Amendment 2 (2009)

IEC 61000-4-3:2006, *Electromagnetic compatibility (EMC) – Part 4-3: Testing and measurement techniques – Radiated, radio-frequency, electromagnetic field immunity test*  
Amendment 1 (2007)  
Amendment 2 (2010)

IEC 61000-4-13:2002, *Electromagnetic compatibility (EMC) – Part 4-13: Testing and measurement techniques – Harmonics and interharmonics including mains signalling at a.c. power port, low-frequency immunity tests*  
Amendment 1 (2009)

*Add the following new normative references as follows:*

IEC 60092-504:2001, *Electrical installations in ships – Part 504: Special features – Control and instrumentation*

IEC 60300-3-5:2001, *Dependability management – Part 3-5: Application guide – Reliability test conditions and statistical test principles*

IEC 61508 (all parts), *Functional safety of electrical/electronic/programmable electronic safety-related systems*

IEC 61649:2008, *Weibull analysis*

IEC 62061:2005, *Safety of machinery – Functional safety of safety-related electrical, electronic and programmable electronic control systems*

IEC 62430:2009, *Environmentally conscious design for electrical and electronic products*

IEC 62474:2012, *Material declaration for products of and for the electrotechnical industry*

ISO 13849-1:2006, *Safety of machinery – Safety-related parts of control systems – Part 1: General principles for design*

## 2 Definitions

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Replace, in the alphabetical list, the existing references to these terms, modified by Amendment 1, by the following new references:

Electronically controlled electromagnet .....	2.3.36
Maximum cross-section .....	2.3.35
Minimum cross-section .....	2.3.34
Multiple tip contact system .....	2.3.33

Replace, in the alphabetical list, the entry "Over-current discrimination" by the following new entry:

Over-current selectivity .....	2.5.23
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Add, in the alphabetical list, the following new terms and references:

Flexible conductor .....	2.3.32
Individual enclosure .....	2.2.23
Insulation coordination barrier .....	2.1.23
Rated control circuit supply voltage .....	2.5.67
Rated control circuit voltage .....	2.5.66
Rigid conductor .....	2.3.31
Solid conductor .....	2.3.29
Solid insulation .....	2.1.22
Stranded conductor .....	2.3.30

### 2.1 General terms

Add, at the end of the existing subclause, the following new terms and definitions:

#### 2.1.22

##### **solid insulation**

solid insulating material interposed between two conductive parts

**2.1.23****insulation coordination barrier**

solid insulating material that is not an integral part, provided for the purpose of increasing either creepage distances or clearance distances or both

**2.2 Switching devices**

*Add, at the end of the existing subclause, the following new term and definition:*

**2.2.23****individual enclosure**

enclosure designed and dimensioned to contain one equipment only

**2.3 Parts of switching devices**

*Add, after the existing definition 2.3.28 added by Amendment 1, the following new terms and definitions and renumber the existing definitions 2.3.29 to 2.3.32 as 2.3.33 to 2.3.36 respectively:*

**2.3.29****solid conductor**

conductor consisting of a single wire

NOTE 1 The solid conductor may be circular or shaped.

NOTE 2 Solid conductor is defined as class 1 conductor in IEC 60228, or by IEC 60344, or equivalent AWG/kcmil.

[461-01-06, modified]

**2.3.30****stranded conductor**

conductor consisting of a number of wires, all or some of which are wound in a helix

NOTE Stranded conductor is defined as class 2 conductor in IEC 60228, or by IEC 60344, or equivalent AWG/kcmil.

[151-12-36, modified]

**2.3.31****rigid conductor**

solid or stranded conductor having wires of such diameters, or so assembled, that the conductor is not suitable for use in a flexible cable

**2.3.32****flexible conductor**

stranded conductor having wires of diameters small enough and so assembled that the conductor is suitable for use in a flexible cable

NOTE Flexible conductor is defined as class 5 or class 6 conductor in IEC 60228, or by IEC 60344, or equivalent AWG/kcmil.

[461-01-11, modified]

**2.5 Characteristic quantities****2.5.23****over-current discrimination**

*Replace the existing term by the new following term:*

**over-current selectivity**

Replace, in the existing note of this definition, the word “discrimination” by “selectivity”.

Delete the existing source “[441-17-15]”.

Add, after the existing definition 2.5.65, the following new terms and definitions:

**2.5.66****rated control circuit voltage** $U_c$ 

rated voltage which is controlling the input signal of the control device

**2.5.67****rated control circuit supply voltage** $U_s$ 

rated voltage applied to energize the power supply terminals of the control circuit

**4 Characteristics**

Add, in the existing table, the following new line:

Characteristic	Symbol	Subclause
Pole impedance of the switching device	Z	4.3.7

Replace, in the existing line “Rated conditional short-circuit current”, the symbol “–” by “ $I_q$ ”, as follows:

Characteristic	Symbol	Subclause
Rated conditional short-circuit current	$I_q$	4.3.6.4

Replace the existing line “Rated control supply voltage” as follows:

Characteristic	Symbol	Subclause
Rated control circuit supply voltage	$U_s$	4.5.1

**4.3.6.1 Rated short-time withstand current ( $I_{cw}$ )**

Replace the existing text of this subclause by the following new text:

The rated short-time withstand current of an equipment is the value of short-time current, assigned to the equipment by the manufacturer, that the equipment can carry without damage, under the test conditions specified in the relevant product standard.

**4.3.6.4 Rated conditional short-circuit current**

Replace the existing title of this subclause by the following new title:

**4.3.6.4 Rated conditional short-circuit current ( $I_q$ )**

Add, before the existing Subclause 4.4, the following new subclause:

#### 4.3.7 Pole impedance of the switching device (Z)

The pole impedance may be stated by the manufacturer and is determined by measuring the voltage drop resulting from the current flowing through the pole.

#### 4.5.1 Electrically or electronically controlled circuits

*Replace the existing fourth dashed item, modified by Amendment 1, by the following new dash:*

- rated control circuit supply voltage  $U_s$  (a.c., d.c.), where applicable;

*Replace the existing Note 1 added by Amendment 1 by the following new note:*

NOTE 1 Distinction is made between the rated control circuit voltage  $U_c$  and the rated control circuit supply voltage  $U_s$  which may be different from  $U_c$  due to the presence of built-in transformers, rectifiers, resistors, electronic circuitry, etc.

*Delete the existing Note 2 added by Amendment 1.*

*Replace the existing paragraph after Note 2, added by Amendment 1, by the following new paragraph:*

The correct operating conditions are based upon a value of the control circuit supply voltage not less than 85 % of its rated value  $U_s$ , with the highest value of control circuit current flowing, nor more than 110 % of its rated value.

### 5.1 Nature of information (standards.iteh.ai)

*Replace the existing eighteenth dashed item under “Characteristics” by the following new dash:*

- control circuit supply voltage, kind of current and frequency, if different from those of the control coil;

*Add, in the existing list “Characteristics” after the item “suitability for isolation”, the following two new dashed items:*

- pole impedance of the switching device (Z);
- material declaration as per Annex W;

### 5.3 Instructions for installation, operation and maintenance

*Move the first sentence of the second existing paragraph to the end of the first paragraph.*

*Replace the second sentence of the second paragraph by the following new sentence:*

For equipment only suitable in environment A (see 7.3.1), the manufacturer shall provide the following notice in documentation, available as information to potential customers and with the product for users:

*Add, after the existing Subclause 5.3, the following new subclause:*

### 5.4 Environmental information

Material declarations according to Annex W shall be provided if required by the relevant product standard.