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## **Kopplingsapparater för högst 1000 V – Del 2: Effektbrytare**

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

Som svensk standard gäller europastandarden EN 60947-2:2006. Den svenska standarden innehåller den officiella engelska språkversionen av EN 60947-2:2006.

### **Nationellt förord**

Europastandarden EN 60947-2:2006<sup>\*)</sup>

består av:

- **europastandardens ikraftsättningsdokument**, utarbetat inom CENELEC
- **IEC 60947-2, Fourth edition, 2006 - Low-voltage switchgear and controlgear - Part 2: Circuit-breakers**

utarbetad inom International Electrotechnical Commission, IEC.

Tidigare fastställd svensk standard SS-EN 60947-2, utgåva 3, 2003, gäller ej fr o m 2009-07-01.

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<sup>\*)</sup> EN 60947-2:2006 ikraftsattes 2006-12-18 som SS-EN 60947-2 genom offentliggörande, d v s utan utgivning av något svenskt dokument.

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English version

**Low-voltage switchgear and controlgear**  
**Part 2: Circuit-breakers**  
(IEC 60947-2:2006)

Appareillage à basse tension  
Partie 2: Disjoncteurs  
(CEI 60947-2:2006)

Niederspannungsschaltgeräte  
Teil 2: Leistungsschalter  
(IEC 60947-2:2006)

This European Standard was approved by CENELEC on 2006-07-01. 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, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the 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 document 17B/1455/FDIS, future edition 4 of IEC 60947-2, 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 EN 60947-2 on 2006-07-01.

This European Standard supersedes EN 60947-2:2003.

The main changes introduced in EN 60947-2:2006 are an amendment to the verification of dielectric properties, the improvement of EMC clauses in Annexes B, F, J and M, and the addition of a new Annex O regarding instantaneous trip circuit-breakers.

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) 2007-04-01
- latest date by which the national standards conflicting  
with the EN have to be withdrawn (dow) 2009-07-01

This European Standard has been prepared under a mandate given to CENELEC by the European Commission and the European Free Trade Association and covers essential requirements of EC Directive EMC (89/336/CEE). See Annex ZZ.

Annexes ZA and ZZ have been added by CENELEC.

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## Endorsement notice

The text of the International Standard IEC 60947-2:2006 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 60112	NOTE Harmonized as EN 60112:2003 (not modified).
IEC 60269-1	NOTE Harmonized as EN 60269-1:1998 (not modified), new edition at draft stage.
IEC 60269-2-1	NOTE Harmonized as HD 60269-2-1:2005 (not modified).
IEC 60269-3	NOTE Harmonized as EN 60269-3:1995 (not modified), new edition at draft stage.
IEC 60439	NOTE Harmonized as EN 60439 (Series) (not modified).
IEC 60947-3	NOTE Harmonized as EN 60947-3:1999 (not modified).
IEC 60947-5-1	NOTE Harmonized as EN 60947-5-1:2004 (not modified).

## Annex ZA (normative)

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

The following referenced documents are indispensable for the application 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 When an international publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 60050-441 A1	1984 2000	International Electrotechnical Vocabulary (IEV) Chapter 441: Switchgear, controlgear and fuses	- -	- -
IEC 60051	Series	Direct acting indicating analogue electrical measuring instruments and their accessories	EN 60051	Series
IEC 60068-2-14 + A1	1984 1986	Environmental testing Part 2: Tests - Test N: Change of temperature	EN 60068-2-14	1999
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 60364	Series	Low-voltage electrical installations	-	-
IEC 60364-4-41	2001	Electrical installations of buildings Part 4-41: Protection for safety - Protection against electric shock	-	-
IEC 60695-2-10	2000	Fire hazard testing Part 2-10: Glowing/hot-wire based test methods - Glow-wire apparatus and common test procedure	EN 60695-2-10	2001
IEC 60695-2-11	2000	Fire hazard testing Part 2-11: Glowing/hot-wire based test methods - Glow-wire flammability test method for end-products	EN 60695-2-11	2001
IEC 60695-2-12	2000	Fire hazard testing Part 2-12: Glowing/hot-wire based test methods - Glow-wire flammability test method for materials	EN 60695-2-12	2001
IEC 60695-2-13	2000	Fire hazard testing Part 2-13: Glowing/hot-wire based test methods - Glow-wire ignitability test method for materials	EN 60695-2-13	2001
IEC/TR 60755 A1 A2	1983 1988 1992	General requirements for residual current operated protective devices	- - -	- - -

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 60898 (mod)	Series	Electrical accessories - Circuit-breakers for overcurrent protection for household and similar installations	EN 60898	Series
IEC 60934	- <sup>1)</sup>	Circuit-breakers for equipment (CBE)	EN 60934	2001 <sup>2)</sup>
IEC 60947-1	2004	Low-voltage switchgear and controlgear Part 1: General rules	EN 60947-1 + corr. November	2004 2004
IEC 60947-4-1 A1	2000 2002	Low-voltage switchgear and controlgear Part 4-1: Contactors and motor-starters - Electromechanical contactors and motor-starters	EN 60947-4-1 A1	2001 2002
IEC 61000-3-2 (mod) A1 + A2	2000 2001 2004	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 <sup>3)</sup> A2	2000 2005
IEC 61000-3-3 A1	1994 2001	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 + corr. July A1	1995 1997 2001
IEC 61000-4-2 A1 A2	1995 1998 2000	Electromagnetic compatibility (EMC) Part 4-2: Testing and measurement techniques - Electrostatic discharge immunity test	EN 61000-4-2 A1 A2	1995 1998 2001
IEC 61000-4-3 A1	2002 2002	Electromagnetic compatibility (EMC) Part 4-3: Testing and measurement techniques - Radiated, radio-frequency, electromagnetic field immunity test	EN 61000-4-3 <sup>4)</sup> A1	2002 2002
IEC 61000-4-4 A1 A2	1995 2000 2001	Electromagnetic compatibility (EMC) Part 4-4: Testing and measurement techniques - Electrical fast transient/burst immunity test	EN 61000-4-4 <sup>5)</sup> A1 A2	1995 2001 2001
IEC 61000-4-5 A1	1995 2000	Electromagnetic compatibility (EMC) Part 4-5: Testing and measurement techniques - Surge immunity test	EN 61000-4-5 A1	1995 2001
IEC 61000-4-6 A1	2003 2004	Electromagnetic compatibility (EMC) Part 4-6: Testing and measurement techniques - Immunity to conducted disturbances, induced by radio-frequency fields	- -	- -

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<sup>1)</sup> Undated reference.

<sup>2)</sup> Valid edition at date of issue.

<sup>3)</sup> EN 61000-3-2 + A2 are superseded by EN 61000-3-2:2006, which is based on IEC 61000-3-2:2005.

<sup>4)</sup> EN 61000-4-3 + A1 are superseded by EN 61000-4-3:2006, which is based on IEC 61000-4-3:2006.

<sup>5)</sup> EN 61000-4-4 + A1 + A2 are superseded by EN 61000-4-4:2004, which is based on IEC 61000-4-4:2004.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 61000-4-11	2004	Electromagnetic compatibility (EMC) Part 4-11: Testing and measurement techniques - Voltage dips, short interruptions and voltage variations immunity tests	EN 61000-4-11	2004
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
IEC 61000-5-2	1997	Electromagnetic compatibility (EMC) Part 5: Installation and mitigation guidelines - Section 2: Earthing and cabling	-	-
IEC 61008-1 (mod) + A1 (mod)	1996 2002	Residual current operated circuit-breakers without integral overcurrent protection for household and similar uses (RCCB's) Part 1: General rules	EN 61008-1	2004
IEC 61009-1 + corr. May + A1 (mod)	1996 2003 2002	Residual current operated circuit-breakers with integral overcurrent protection for household and similar uses (RCBO's) Part 1: General rules	EN 61009-1 + corr. July	2004 2006
CISPR 11 (mod) +A1 (mod)	2003 2004	Industrial scientific and medical (ISM) radio- frequency equipment - Electromagnetic disturbance characteristics - Limits and methods of measurement	- EN 55011	- 200X <sup>6)</sup>
CISPR 22 (mod) A1	2005 2005	Information technology equipment - Radio disturbance characteristics - Limits and methods of measurement	EN 55022 -	200X <sup>6)</sup> -

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<sup>6)</sup> To be published.

## **Annex ZZ** (informative)

### **Coverage of Essential Requirements of EC 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 all relevant essential requirements as given in Article 4 of the EC Directive 89/336/EEC.

Compliance with this standard provides one means of conformity with the specified essential requirements of the Directive concerned.

**WARNING:** Other requirements and other EC Directives may be applicable to the products falling within the scope of this standard.



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## LOW-VOLTAGE SWITCHGEAR AND CONTROLGEAR –

### Part 2: Circuit-breakers

#### 1 General

The provisions of the general rules dealt with in IEC 60947-1 are applicable to this standard, where specifically called for. Clauses and subclauses, tables, figures and annexes of the general rules thus applicable are identified by reference to IEC 60947-1, for example, 1.2.3 of IEC 60947-1, Table 4 of IEC 60947-1, or Annex A of IEC 60947-1.

##### 1.1 Scope and object

This standard applies to circuit-breakers, the main contacts of which are 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.; it also contains additional requirements for integrally fused circuit-breakers.

It applies whatever the rated currents, the method of construction or the proposed applications of the circuit-breakers may be.

The requirements for circuit-breakers which are also intended to provide earth-leakage protection are contained in Annex B.

The additional requirements for circuit-breakers with electronic over-current protection are contained in Annex F.

The additional requirements for circuit-breakers for IT systems are contained in Annex H.

The requirements and test methods for electromagnetic compatibility of circuit-breakers are contained in Annex J.

The requirements for circuit-breakers not fulfilling the requirements for over-current protection are contained in Annex L.

The requirements for modular residual current devices (without integral current breaking device) are contained in Annex M.

The requirements and test methods for electromagnetic compatibility of circuit-breaker auxiliaries are contained in Annex N.

Supplementary requirements for circuit-breakers used as direct-on-line starters are given in IEC 60947-4-1, applicable to low-voltage contactors and starters.

The requirements for circuit-breakers for the protection of wiring installations in buildings and similar applications, and designed for use by uninstructed persons, are contained in IEC 60898.

The requirements for circuit-breakers for equipment (for example electrical appliances) are contained in IEC 60934.

For certain specific applications (for example traction, rolling mills, marine service) particular or additional requirements may be necessary.

NOTE Circuit-breakers which are dealt with in this standard may be provided with devices for automatic opening under predetermined conditions other than those of over-current and undervoltage as, for example, reversal of power or current. This standard does not deal with the verification of operation under such pre-determined conditions.

The object of this standard is to state:

- a) the characteristics of circuit-breakers;
- b) the conditions with which circuit-breakers shall comply with reference to:
  - 1) operation and behaviour in normal service;
  - 2) operation and behaviour in case of overload and operation and behaviour in case of short-circuit, including co-ordination in service (discrimination and back-up protection);
  - 3) dielectric properties;
- c) tests intended for confirming that these conditions have been met and the methods to be adopted for these tests;
- d) information to be marked on or given with the apparatus.

## 1.2 Normative references

The following referenced documents are indispensable for the application 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.

IEC 60050(441):1984, *International Electrotechnical Vocabulary (IEV) – Chapter 441: Switchgear, controlgear and fuses*  
Amendment 1 (2000)

IEC 60051 (all parts) *Direct acting indicating analogue electrical measuring instruments and their accessories*

IEC 60068-2-14:1984, *Environmental testing – Part 2: Tests. Test N: Change of temperature*  
Amendment 1 (1986)

IEC 60068-2-30:2005, *Environmental testing – Part 2-30: Tests – Test Db: Damp heat, cyclic (12 h + 12 h cycle)*

IEC 60364 (all parts), *Electric installations of buildings*

IEC 60364-4-41:2001, *Electrical installations of buildings – Part 4-41: Protection for safety – Protection against shock*

IEC 60695-2-10:2000, *Fire hazard testing – Part 2-10: Glowing/hot-wire based test methods – Glow-wire apparatus and common test procedure*

IEC 60695-2-11:2000, *Fire hazard testing – Part 2-11: Glowing/hot-wire based test methods – Glow-wire flammability test method for end-products*

IEC 60695-2-12:2000, *Fire hazard testing – Part 2-12: Glowing/hot-wire based test methods – Glow-wire flammability test method for materials*

IEC 60695-2-13:2000, *Fire hazard testing – Part 2-13: Glowing/hot-wire based test methods – Glow-wire ignitability test method for materials*

IEC 60755:1983, *General requirements for residual current operated protective devices*  
Amendment 1 (1988)  
Amendment 2 (1992)



IEC 60898, *Circuit-breakers for over-current protection for household and similar installations*

IEC 60934, *Circuit-breakers for equipment (CBE)*

IEC 60947-1:2004, *Low-voltage switchgear and controlgear – Part 1: General rules*

IEC 60947-4-1:2000, *Low-voltage switchgear and controlgear – Part 4-1: Contactors and motor-starters – Electromechanical contactors and motor-starters*  
Amendment 1 (2002)

IEC 61000-3-2:2000, *Electromagnetic compatibility (EMC) – Part 3-2: Limits – Limits for harmonic current emissions (equipment input current  $\leq 16$  A per phase)*  
Amendment 1 (2001)  
Amendment 2 (2004)

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  $\leq 16$  A*  
Amendment 1 (2001)

IEC 61000-4-2:1995, *Electromagnetic compatibility (EMC) – Part 4: Testing and measurement techniques – Section 2: Electrostatic discharge immunity test*  
Amendment 1 (1998)  
Amendment 2 (2000)

IEC 61000-4-3:2002, *Electromagnetic compatibility (EMC) – Part 4-3: Testing and measurement techniques – Radiated radio-frequency electromagnetic field immunity test*  
Amendment 1 (2002)

IEC 61000-4-4:1995, *Electromagnetic compatibility (EMC) – Part 4: Testing and measurement techniques – Section 4: Electrical fast transient/burst immunity test*  
Amendment 1 (2000)  
Amendment 2 (2001)

IEC 61000-4-5:1995, *Electromagnetic compatibility (EMC) – Part 4: Testing and measurement techniques – Section 5: Surge immunity test*  
Amendment 1 (2000)

IEC 61000-4-6:2003, *Electromagnetic compatibility (EMC) – Part 4-6: Testing and measurement techniques – Immunity to conducted disturbances, induced by radiofrequency fields*  
Amendment 1 (2004)

IEC 61000-4-11:2004, *Electromagnetic compatibility (EMC) – Part 4-11: Testing and measurement techniques – Voltage dips, short interruptions and voltage variations immunity tests*

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*

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

IEC 61008-1:1996, *Residual current operated circuit-breakers without integral over-current protection for household and similar uses (RCCBs) – Part 1: General rules*  
Amendment 1 (2002)



IEC 61009-1:1996, *Residual current operated circuit-breakers with integral over-current protection for household and similar uses (RCBOs) – Part 1: General rules*  
Amendment 1 (2002)

CISPR 11:2003, *Industrial, scientific and medical (ISM) radio-frequency equipment – Electromagnetic disturbance characteristics – Limits and methods of measurement*  
Amendment 1 (2004)

CISPR 22:2005, *Information technology equipment – Radio disturbance characteristics – Limits and methods of measurement*  
Amendment 1 (2005)