SLOVENSKI STANDARD
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Nizkonapetostne stikalne in krmilne naprave – 2. del: Odklopniki

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

Niederspannungsschaltgeräte -- Teil 2: Leistungsschalter

Appareillage à basse tension -- Partie 2: Disjoncteurs

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

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29.130.20	Nizkonapetostne stikalne in krmilne naprave	Low voltage switchgear and controlgear

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Descriptors: Low-voltage switchgear and controlgear, circuit-breaker, definition, classification, characteristics, test

English version

Low-voltage switchgear and controlgear
Part 2: Circuit-breakers
(IEC 947-2:1995)

Appareillage à basse tension
Partie 2: Disjoncteurs
(CEI 947-2:1995)

Niederspannung-Schaltgeräte
Teil 2: Leistungsschalter
(IEC 947-2:1995)

This European Standard was approved by CENELEC on 1995-11-28. 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 document 17B/636/FDIS, future amendment to IEC 947-2:1989, 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 A3 to EN 60947-2:1991 on 1995-11-28.

The text of this document, together with that of IEC 947-2:1989, its corrigenda of 1989 and 1990, and its amendments 1:1992 and 2:1993, was published by IEC as the second edition of IEC 947-2 in December 1995. According to a decision of principle taken by the Technical Board of CENELEC, the approval of EN 60947-2:1991/A3 has been converted into the approval of a new EN 60947-2.

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) 1996-09-01
- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 1996-09-01

For products which have complied with EN 60947-2:1991 with its corrigendum March 1993 and its amendments A1:1993 and A2:1995 before 1996-09-01, as shown by the manufacturer or by a certification body, this previous standard may continue to apply for production until 2001-09-01.

Annexes designated "normative" are part of the body of the standard.
Annexes designated "informative" are given for information only.
In this standard, annexes A, B, C, F, G, H and ZA are normative and annexes D and E are informative.
Annex ZA has been added by CENELEC.

Endorsement notice

The text of the International Standard IEC 947-2:1995 was approved by CENELEC as a European Standard without any modification.

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
IEC 50(441)	1984	International electrotechnical vocabulary (IEV) Chapter 441: Switchgear, controlgear and fuses	-	-
IEC 68-2-30	1980	Basic environmental testing procedures Part 2: Tests - Test Db and guidance: Damp heat, cyclic (12 + 12 hour cycle)	HD 323.2.30 S3[1)]	1988
IEC 112	1979	Method for determining the comparative and the proof tracking indices of solid insulating materials under moist conditions	HD 214 S2	1980
IEC 269-1	1986	Low-voltage fuses Part 1: General requirements	EN 60269-1	1989
IEC 269-2-1 (mod)	1987	Part 2: Supplementary requirements for fuses for use by authorized persons (fuses mainly for industrial application) Sections I to III	R032-001	1993
IEC 269-3	1987	Part 3: Supplementary requirements for fuses for use by unskilled persons (fuses mainly for household and similar applications)	EN 60269-3	1995
IEC 364-4-41	1982[2)]	Electrical installations of buildings Part 4: Protection for safety Chapter 41: Protection against electric shock	-	-
IEC 755	1983	General requirements for residual current operated protective devices	-	-

1) HD 323.2.30 S3 includes A1:1985 to IEC 68-2-30.

2) IEC 364-4-41:1992, mod. is harmonized as HD 384.4.41 S2:1996.

Publication	Year	Title	EN/HD	Year
IEC 898 (mod)	1987	Circuit-breakers for overcurrent protection for household and similar installations	EN 60898[3]	1991
			+ corr. October	1991
			+ A11	1994
			+ A12	1995
			+ A13	1995
			+ A14	1995
			+ A15	1995
IEC 934 (mod)	1988	Circuit-breakers for equipment (CBE)	EN 60934[4]	1990
IEC 947-1 (mod)	1988	Low-voltage switchgear and controlgear Part 1: General rules	EN 60947-1	1991
			+ corr. March	1993
IEC 947-4-1	1990	Part 4: Contactors and motor-starters Section 1: Electromechanical contactors and motor-starters	EN 60947-4-1	1992
			+ corr. March	1993
IEC 1000-4-2	1995	Electromagnetic compatibility (EMC) Part 4: Testing and measurement techniques Section 2: Electrostatic discharge immunity test	EN 61000-4-2	1995
IEC 1000-4-3	1995	Section 3: Radiated, radio-frequency, electromagnetic field immunity test	-	-
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 1008-1 (mod)	1990	Electrical accessories Residual current operated circuit-breakers without integral overcurrent protection for household and similar uses (RCCB's) Part 1: General rules	EN 61008-1[5]	1994
			+ corr. September	1994
			+ A11	1995
IEC 1009-1 (mod)	1991	Electrical accessories Residual current operated circuit-breakers with integral overcurrent protection for household and similar uses (RCBO's) Part 1: General rules	EN 61009-1	1994
			+ corr. September	1994
			+ A11	1995

3) EN 60898 includes corrigendum May 1988 + A2:1990 + A3:1990 + corrigendum August 1990 to IEC 898.

4) EN 60934 is superseded by EN 60934:1994, which is based on IEC 934:1993, mod.

5) EN 61008-1 includes A1:1992 to IEC 1008-1.

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1995-12

Appareillage à basse tension

Partie 2:
Disjoncteurs

Low-voltage switchgear and controlgear

Part 2:
Circuit-breakers

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For price, see current catalogue

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

LOW-VOLTAGE SWITCHGEAR AND CONTROLGEAR –

Part 2: Circuit-breakers

FOREWORD

1) The IEC (International Electrotechnical Commission) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of the IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, the IEC publishes International Standards. Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. The IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.

2) The formal decisions or agreements of the IEC on technical matters, express as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested National Committees.

3) The documents produced have the form of recommendations for international use and are published in the form of standards, technical reports or guides and they are accepted by the National Committees in that sense.

4) In order to promote international unification, IEC National Committees undertake to apply IEC International Standards transparently to the maximum extent possible in their national and regional standards. Any divergence between the IEC Standard and the corresponding national or regional standard shall be clearly indicated in the latter.

5) The IEC provides no marking procedure to indicate its approval and cannot be rendered responsible for any equipment declared to be in conformity with one of its standards.

6) Attention is drawn to the possibility that some of the elements of this International Standard may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 947-2 has been prepared by sub-committee 17B: Low-voltage switchgear and controlgear, of IEC technical committee 17: Switchgear and controlgear.

This second edition replaces the first edition published in1989, corrigenda of 1989 and 1990, amendments 1 (1992) and 2 (1993). This second edition constitutes a technical revision.

The text of this standard is based on the first edition, corrigenda, amendments 1 and 2 and the following documents:

FDIS	Report on voting
17B/636/FDIS	17B/718/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.

Annexes A, B, C, F, G and H form an integral part of this standard.

Annexes D and E are for information only.

LOW-VOLTAGE SWITCHGEAR AND CONTROLGEAR –

Part 2: Circuit-breakers

1 General

The provisions of the general rules dealt with in IEC 947-1 (hereinafter referred to as Part 1) are applicable to this standard, where specifically called for. Clauses and subclauses, tables, figures and appendices of the general rules thus applicable are identified by reference to Part 1, for example, 1.2.3 of Part 1, table 4 of Part 1, or annex A of Part 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.

Supplementary requirements for circuit-breakers used as direct-on-line starters are given in IEC 947-4-1, 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 898.

The requirements for circuit-breakers for equipment (for example electrical appliances) are contained in IEC 934.

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 predetermined 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 normative documents contain provisions which, through reference in this text, constitute provisions of this part of IEC 947. At the time of publication, the editions indicated were valid. All normative documents are subject to revision, and parties to agreements based on this part of IEC 947 are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

IEC 50(441): 1984, *International Electrotechnical Vocabulary (IEV) – Chapter 441: Switchgear, controlgear and fuses*

IEC 68-2-30: 1980, *Environmental testing – Part 2: Tests – Test Db and guidance: Damp heat, cyclic (12+12-hour cycle)*

IEC 112: 1979, *Method for determining the comparative and the proof-tracking indices of solid insulating materials under moist conditions*

IEC 269-1: 1986, *Low-voltage fuses – Part 1: General requirements*

IEC 269-2-1: 1987, *Low voltage fuses – Part 2: Supplementary requirements for fuses for use by authorized persons (fuses mainly for industrial application)*

IEC 269-3: 1987, *Low-voltage fuses – Part 3: Supplementary requirements for fuses for use by unskilled persons (fuses mainly for household and similar applications)*

IEC 364, *Electric installations of buildings*

IEC 364-4-41: 1982, *Electric installations of buildings – Part 4: Protection for safety – Chapter 41: Protection against shock*

IEC 755: 1983, *General requirements for residual current operated protective devices*

IEC 898: 1987, *Circuit-breakers for over-current protection for household and similar installations*

IEC 934: 1988, *Circuit-breakers for equipment (CBE)*

IEC 947-1: 1988, *Low-voltage switchgear and controlgear – Part 1: General rules*

IEC 947-4-1: 1990, *Low-voltage switchgear and controlgear – Part 4: Contactors and motor-starters – Section One: Electromechanical contactors and motors-starters*

IEC 1000-4-2: 1995, *Electromagnetic compatibility – Part 4: Testing and measurement techniques – Section 2: Electrostatic discharge immunity test*

IEC 1000-4-3: 1995, *Electromagnetic compatibility – Part 4: Testing and measurement techniques – Section 3: Radiated, radio-frequency, electromagnetic field immunity test*

IEC 1000-4-4: 1995, *Electromagnetic compatibility – Part 4: Testing and measurement techniques – Section 4: Electrical fast transient/burst immunity test*

IEC 1000-4-5: 1995, *Electromagnetic compatibility – Part 4: Testing and measurement techniques – Section 5: Surge immunity test*

IEC 1008-1: 1990, *Residual current operated circuit-breakers without integral over-current protection for household and similar uses (RCCB's) – Part 1: General rules*

IEC 1009-1: 1991, *Residual current operated circuit-breakers with integral over-current protection for household and similar uses (RCBO's) – Part 1: General rules*

2 Definitions

For the majority of the definitions required in connection with this standard, see Clause 2 of Part 1.

For the purpose of this standard, the following additional definitions shall apply:

NOTE – Where these definitions are taken unchanged from the International Electrotechnical Vocabulary (IEV), IEC 50(441), the IEV reference is given in brackets.

2.1 **circuit-breaker:** A mechanical switching device, capable of making, carrying and breaking currents under normal circuit conditions and also making, carrying for a specified time and breaking currents under specified abnormal circuit conditions such as those of short-circuit. [IEV 441-14-20]

2.1.1 **frame size:** A term designating a group of circuit-breakers, the external physical dimensions of which are common to a range of current ratings. Frame size is expressed in amperes corresponding to the highest current rating of the group. Within a frame size, the width may vary according to the number of poles.

NOTE – This definition does not imply dimensional standardization.

2.1.2 **construction break:** A significant difference in construction between circuit-breakers of a given frame size, requiring additional type testing (see 7.1.5).

2.2 **integrally fused circuit-breaker:** A combination, in a single device, of a circuit-breaker and fuses, one fuse being placed in series with each pole of the circuit-breaker intended to be connected to a phase conductor. [IEV 441-14-22]

2.3 **current-limiting circuit-breaker:** A circuit-breaker with a break-time short enough to prevent the short-circuit current reaching its otherwise attainable peak value. [IEV 441-14-21]

2.4 **plug-in circuit-breaker:** A circuit-breaker which, in addition to its interrupting contacts, has a set of contacts which enable the circuit-breaker to be removed.

NOTE – Some circuit-breakers may be of the plug-in type on the line side only, the load terminals being usually suitable for wiring connection.

2.5 **withdrawable circuit-breaker:** A circuit-breaker which, in addition to its interrupting contacts, has a set of isolating contacts which enable the circuit-breaker to be disconnected from the main circuit, in the withdrawn position, to achieve an isolating distance in accordance with specified requirements.

2.6 **moulded-case circuit-breaker:** A circuit-breaker having a supporting housing of moulded insulating material forming an integral part of the circuit-breaker. [IEV 441-14-24]

2.7 **air circuit-breaker:** A circuit-breaker in which the contacts open and close in air at atmospheric pressure. [IEV 441-14-27]

2.8 **vacuum circuit-breaker:** A circuit-breaker in which the contacts open and close within a highly evacuated envelope. [IEV 441-14-29]

2.9 **gas circuit-breaker:** A circuit-breaker in which the contacts open and close in a gas other than air at atmospheric or higher pressure.

2.10 **making-current release:** A release which permits a circuit-breaker to open, without any intentional time-delay, during a closing operation, if the making current exceeds a predetermined value, and which is rendered inoperative when the circuit-breaker is in the closed position.

2.11 **short-circuit release:** An over-current release intended for protection against short circuits.

2.12 **short-time delay short-circuit release:** An over-current release intended to operate at the end of the short-time delay (see 2.5.26 of Part 1).

2.13 **alarm switch:** An auxiliary switch which operates only upon the tripping of the circuit-breaker with which it is associated.

2.14 **circuit-breaker with lock-out device preventing closing:** A circuit-breaker in which each of the moving contacts is prevented from closing sufficiently to be capable of passing current if the closing command is initiated while specified conditions remain established.

2.15 **short-circuit breaking (or making) capacity:** A breaking (or making) capacity for which the prescribed conditions include a short circuit.

2.15.1 **ultimate short-circuit breaking capacity:** A breaking capacity for which the prescribed conditions according to a specified test sequence do not include the capability of the circuit-breaker to carry its rated current continuously.

2.15.2 **service short-circuit breaking capacity:** A breaking capacity for which the prescribed conditions according to a specified test sequence include the capability of the circuit-breaker to carry its rated current continuously.