



BSI Standards Publication

Electrical accessories — Circuit-breakers for overcurrent protection for household and similar installations

Part 3: Circuit-breakers for DC operation

National foreword

This British Standard is the UK implementation of EN IEC 60898-3:2025+A11:2025. It is derived from IEC 60898-3:2019, incorporating amendment 1:2022. It supersedes BS IEC 60898-3:2019+A1:2022, which is withdrawn.

The start and finish of text introduced or altered by amendment is indicated in the text by tags. Tags indicating changes to IEC text carry the number of the IEC amendment. For example, text altered by IEC amendment 1 is indicated by A1 A1.

The start and finish of text introduced or altered by amendment A11 is indicated in the text by tags. Tags indicating changes to text carry the number of the CENELEC amendment. For example, text altered by CENELEC amendment A11 is indicated by A11 A11.

The UK participation in its preparation was entrusted to Technical Committee PEL/23/1, Circuit breakers and similar equipment for household use.

A list of organizations represented on this committee can be obtained on request to its committee manager.

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English Version

Electrical accessories - Circuit-breakers for overcurrent
protection for household and similar installations - Part 3: Circuit-
breakers for DC operation
(IEC 60898-3:2019)

Petit appareillage électrique - disjoncteurs pour la protection
contre les surintensités pour installations domestiques et
analogues - Partie 3: Disjoncteurs pour le fonctionnement
en courant continu
(IEC 60898-3:2019)

Elektrisches Installationsmaterial - Leitungsschutzschalter
für Hausinstallationen und ähnliche Zwecke - Teil 3:
Leitungsschutzschalter für Gleichstrom (DC)
(IEC 60898-3:2019)

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European Committee for Electrotechnical Standardization
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Europäisches Komitee für Elektrotechnische Normung

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European foreword

This document (EN IEC 60898-3:2025) consists of the text of document IEC 60898-3:2019, prepared by SC 23E "Circuit-breakers and similar equipment for household use" of IEC/TC 23 "Electrical accessories".

The following dates are fixed:

- latest date by which this document has to be (dop) 2026-03-31
implemented at national level by publication of an
identical national standard or by endorsement
- latest date by which the national standards (dow) 2028-03-31
conflicting with this document have to be withdrawn

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This document is read in conjunction with EN IEC 60898-3:2025/A1:2025 and EN IEC 60898-3:2025/A11:2025.

This document has been prepared under a standardisation request addressed to CENELEC by the European Commission. The Standing Committee of the EFTA States subsequently approves these requests for its Member States.

For the relationship with EU Legislation, see informative Annex ZZ, which is an integral part of EN IEC 60898-3:2025/A11:2025.

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The text of the International Standard IEC 60898-3:2019 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 standard indicated:

IEC 60038	NOTE	Approved as EN 60038
IEC 60060-1:2010	NOTE	Approved as EN 60060-1:2010 (not modified)
IEC 60112	NOTE	Approved as EN IEC 60112
IEC 60364 series	NOTE	Approved as HD 60364 series
IEC 60364-4-41:2005	NOTE	Approved as HD 60364-4-41:2017 +A11:2017
IEC 60664-3	NOTE	Approved as EN 60664-3
IEC 60898-1:2015	NOTE	Approved as EN 60898-1:2019 +A11:2024
IEC 60898-2:2016	NOTE	Approved as EN 60898-2:2021
IEC 60998-1:2002	NOTE	Approved as EN 60998-1:2004
IEC 60998-2-2:2002	NOTE	Approved as EN 60998-2-2:2004
IEC 60999 series	NOTE	Approved as EN 60999 series
ISO 2039-2:1987	NOTE	Approved as EN ISO 2039-2:1999 (not modified)

European foreword to Amendment 1

This document (EN IEC 60898-3:2025/A1:2025) consists of the text of document IEC 60898-3:2019/AMD1:2022, prepared by SC 23E "Circuit-breakers and similar equipment for household use" of IEC/TC 23 "Electrical accessories".

The following dates are fixed:

- latest date by which this document has to be (dop) 2026-03-31 implemented at national level by publication of an identical national standard or by endorsement
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This document is read in conjunction with EN IEC 60898-3:2025 and EN IEC 60898-3:2025/A11:2025.

This document has been prepared under a standardisation request addressed to CENELEC by the European Commission. The Standing Committee of the EFTA States subsequently approves these requests for its Member States.

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European foreword to Amendment A11

This document (EN IEC 60898-3:2025/A11:2025) has been prepared by CLC/TC 23E “Circuit breakers and similar devices for household and similar applications”.

The following dates are fixed:

- latest date by which this document has to be (dop) 2026-03-31
implemented at national level by publication of
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A11 Annex ZA (normative)

Normative references to international publications with their corresponding European publications

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 1 Where an International Publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

NOTE 2 Up-to-date information on the latest versions of the European Standards listed in this annex is available here: www.cenelec.eu.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN / HD</u>	<u>Year</u>
		Direct acting indicating analogue electrical measuring instruments and their accessories	EN 60051-1	2017
		-		
IEC 60050-441	-	International Electrotechnical Vocabulary. Switchgear, controlgear and fuses	-	-
IEC 60227	series	Polyvinyl chloride insulated cables of rated voltages up to and including 450/750V	EN 50525-1 + 1	2011 2022
IEC 60228	2004	Conductors of insulated cables	EN 60228	2005
IEC 60269	series	Low-voltage fuses	EN 60269-1 + 1 + 2	2007 2009 2014
		Low-voltage electrical installations - Part 5-52: selection and erection of electrical equipment - Wiring systems	HD 60364-5-52	2011
IEC 60417	Database	Graphical symbols for use on equipment. Available from: https://www.graphical-symbols.info/equipment	-	-
IEC 60529	-	Degrees of protection provided by enclosures (IP Code)	EN 60529 + 1 + 2	1991 2000 2013
IEC 60664-1	2007	Insulation co-ordination for equipment within low voltage systems . Part 1: Principles, requirements and tests	EN IEC 60664-1	2020
IEC 60695-2-10	-	Fire hazard testing - Part 2-10: Glowing/hot-wire based test methods - Glow-wire apparatus and common test procedure	EN IEC 60695-2-10	2021
IEC 60695-2-11	2014	Fire hazard testing - Part 2-11: Glowing/hot-wire based test methods – Glow- wire flammability test method for end products	EN IEC 60695-2-11	2021
IEC 60947-2	2016	Low-voltage switchgear and controlgear – Part 2 Circuit-breakers	EN 60947-2 + 1	2017 2020

Annex ZB (normative)

Special national conditions

Special national condition: National characteristic or practice that cannot be changed even over a long period, e.g. climatic conditions, electrical earthing conditions.

NOTE If it affects harmonization, it forms part of the European Standard or Harmonization Document.

For the countries in which the relevant special national conditions apply these provisions are normative, for other countries they are informative.

<u>Clause</u>	<u>Special national condition</u>
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H.1	Czech Republic, Netherlands, Norway and Switzerland
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The upper limit of current for use of screwless terminals is 16 A.

H.3.3	Austria, Belgium, Denmark, France, Germany, Italy, Portugal, Spain and Sweden
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Only universal screwless type terminals are accepted.

I1	Belgium, Italy and Spain
----	---------------------------------

The use of circuit-breakers with flat quick-connect terminations for rated currents up to and including 20 A is accepted.

I.8.2.2	Belgium, Italy and Spain
---------	---------------------------------

The use for rated currents up to and including 20 A is accepted.

Annex ZZ (informative)

Relationship between this European standard and the safety objectives of Directive 2014/35/EU [2014 OJ L96] aimed to be covered

This European standard has been prepared under a Commission's standardization request relating to harmonized standards in the field of the Low Voltage Directive, M/511, to provide one voluntary means of conforming to safety objectives of Directive 2014/35/EU of the European Parliament and of the Council of 26 February 2014 on the harmonization of the laws of the Member States relating to the making available on the market of electrical equipment designed for use within certain voltage limits [2014 OJ L96].

Once this standard is cited in the Official Journal of the European Union under that Directive, compliance with the normative clauses of this standard given in Table ZZ.1 confers, within the limits of the scope of this standard, a presumption of conformity with the corresponding safety objectives of that Directive, and associated EFTA regulations.

Table ZZ.1 — Correspondence between this European standard and Article 3 of Directive 2014/35/EU [2014 OJ L153]

Safety Objectives of Directive 2014/35/EU	Clause(s) / subclause(s) of this EN	Remarks / Notes
(1)(a)	1, H.1, I.1, 2, H.2, H.10, I.2, 3, H.3, I.3, 4, H.4, I.4, 5, H.5, I.5, 6, H.6, I.6 – 9.3, Annex ZB, Annex ZC	
(1)(b)	8.1, Annex D – 9.4, 9.5, H.8.1 to H.8.5 – H.9.1, H.9.2, I.8.1, I.8.2- I.9.1, Annex ZC	
(1)(c)	7, H.7, I.7 – 9.1, 9.2, Annex G	
(2) ()	8.2 – 9.6, 8.7 – 9.11, Annex B	
(2) ()	8.4, 8.14 – 9.8, 8.6 – 9.10, 8.7 – 9.11, 8.8 – 9.12, 8.15 – 9.12.11.2.3, Annex B	
(2) ()	8.1.2 – 9.10.3	
(2) ()	8.1.3 - 9.7, Annex A, 8.3 – 9.7	
(3) ()	8.9 – 9.13, 8.12 – 9.16, 8.5 – 9.9, H.8.6 – H.9.3	
(3) ()	8.10 – 9.14, 8.11 – 9.15, 8.16, 8.17, 8.13 – 9.17	
(3) ()	8.6 – 9.10, 8.8 – 9.12, 8.15 – 9.12.11.2.3, 8.4 – 9.8	

WARNING 1 — Presumption of conformity stays valid only as long as a reference to this European standard is maintained in the list published in the Official Journal of the European Union. Users of this standard should consult frequently the latest list published in the Official Journal of the European Union.

WARNING 2 — Other Union legislation may be applicable to the product(s) falling within the scope of this standard. 

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

ELECTRICAL ACCESSORIES – CIRCUIT-BREAKERS FOR OVERCURRENT PROTECTION FOR HOUSEHOLD AND SIMILAR INSTALLATIONS –

Part 3: Circuit-breakers for DC operation

FOREWORD

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International Standard IEC 60898-3 has been prepared by sub-committee 23E: Circuit-breakers and similar equipment for household use, of IEC technical committee 23: Electrical accessories.

The text of this International Standard is based on the following documents:

FDIS	Report on voting
23E/1122FDIS	23E/1126/RVD

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

This document has been drafted in accordance with the ISO/IEC Directives, Part 2.

A list of all parts in the IEC 60898 series, published under the general title *Electrical accessories – Circuit-breakers for overcurrent protection for household and similar installations*, can be found on the IEC website.

In this document, the following print types are used:

- Requirements proper: in roman type.
- *Test specifications: in italic type.*
- Explanatory matter: in smaller roman type.

The following differences exist in the countries indicated below.

- 4.7, Note 2: In China, other ranges of instantaneous tripping defined by the manufacturer are allowed.
- Clause 6, Notes 1 and 2: In the following countries: DK, FI, NO, SE and ZA the marking of the symbol on the circuit-breaker is mandatory to indicate that the device provides isolation for the installation downstream. In Australia this marking on the circuit-breaker is mandatory but is not required to be visible after installation.
- H.1, Note: In CZ, DK, NL, NO and CH, the upper limit of current for use of screwless terminals is 16 A.
- H.3.3, Note 1 to entry: In the following countries only universal screwless type terminals are accepted: AT, BE, CN, DK, DE, ES, FR, IT, PT and SE.
- Clause I.1, Note: The use of circuit-breakers with flat quick-connect terminations for rated currents up to and including 20 A is accepted in BE, FR, IT, ES, PT and US.
- I.8.2.2, Note 1: The use for rated currents up to and including 20 A is accepted in BE, FR, IT, PT, ES and US.
- Clause J.1, Note: In Austria, Australia and Germany, the use of aluminium screw-type terminals for use with copper conductors is not allowed.
- In Austria and Germany, terminals for aluminium conductors only are not allowed.
- In Spain, the use of aluminium conductors is not allowed for final circuits in household and similar installations e.g. offices, shops.
- In Denmark, the minimum cross-sectional area for aluminium conductors is 16 mm².

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under "<http://webstore.iec.ch>" in the data related to the specific document. At this date, the document will be

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

A bilingual version of this publication may be issued at a later date.

ELECTRICAL ACCESSORIES – CIRCUIT-BREAKERS FOR OVERCURRENT PROTECTION FOR HOUSEHOLD AND SIMILAR INSTALLATIONS –

Part 3: Circuit-breakers for DC operation

1 Scope

This part of IEC 60898 applies to DC circuit-breakers, having a rated DC voltage not exceeding 440 V, a rated current not exceeding 125 A and a rated short-circuit capacity not exceeding 10 000 A.

These circuit-breakers are intended for the protection against overcurrents of wiring installations of buildings and similar applications; they are designed for use by uninstructed people and for not being maintained.

They are intended for use in an environment with pollution degree 2 and A_{11} overvoltage category III. A_{11}

They are suitable for isolation.

A_{11} Circuit-breakers of this document are also suitable for use in IT systems provided that the requirements of HD 60364-4-43:2010 are met. A_{11}

This document also applies to circuit-breakers having more than one rated current, provided that the means for changing from one discrete rating to another is not accessible in normal service and that the rating cannot be changed without the use of a tool.

This document does not apply to

- circuit-breakers intended to protect motors;
- circuit-breakers, the current setting of which is adjustable by means accessible to the user.

For circuit-breakers having a degree of protection higher than IP20 according to IEC 60529, for use in locations where arduous environmental conditions prevail (e.g. excessive humidity, heat or cold or deposition of dust) and in hazardous locations (e.g. where explosions are liable to occur), special constructions can be required.

For an environment with a higher pollution degree, enclosures giving the appropriate degree of protection are used.

This document does not apply to circuit-breakers for AC operation, which is covered by IEC 60898-1.

This document does not apply to circuit-breakers for AC and DC operation, which is covered by IEC 60898-2.

Circuit breakers according to this document have a high resistance against unwanted tripping, regardless whether caused by in-rush currents through loading of electronic loads or by switching operations in the circuit.

A_{11} NOTE 1 A_{11} Circuit-breakers within the scope of this document can also be used for protection against electric shock in case of a fault, depending on their tripping characteristics and on the characteristics of the installation. The criterion of application for such purposes is dealt with by installation rules.

A_{11} NOTE 2 Recommendations for the dimensional coordination between enclosures and circuit breakers for mounting on rails according to EN 60715 or equivalent means are given in the CENELEC report PD CLC/TR 50473. A_{11}

This document contains all requirements necessary to ensure compliance with the operational characteristics required for these devices by type tests.

It also contains the details relative to test requirements and methods of testing necessary to ensure reproducibility of test results.

Guidance on the coordination, under short-circuit conditions, between a circuit-breaker and another short-circuit protective device (SCPD) is given in Annex C.

Routine tests intended to reveal, as far as safety is concerned, unacceptable variations in material or manufacture are given in Annex G.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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.

Ⓐ11 EN 60051-1:2017, *Direct acting indicating analogue electrical measuring instruments and their accessories - Part 1: Definitions and general requirements common to all parts (IEC 60051-1:2016)*

HD 60364-5-52:2011, *Low-voltage electrical installations - Part 5-52: Selection and erection of electrical equipment - Wiring systems (IEC 60364-5-52:2009)* Ⓐ11

IEC 60050-441, *International Electrotechnical Vocabulary – Switchgear, controlgear and fuses* (available at <http://www.electropedia.org>)

IEC 60227 (all parts), *Polyvinyl chloride insulated cables of rated voltages up to and including 450/750 V*

IEC 60228:2004, *Conductors of insulated cables*

IEC 60269 (all parts), *Low-voltage fuses*

IEC 60417, *Graphical symbols for use on equipment* (available at <http://www.graphical-symbols.info/equipment>)

IEC 60529, *Degrees of protection provided by enclosures (IP Code)*

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

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

IEC 60695-2-11:2014, *Fire hazard testing – Part 2-11: Glowing/hot-wire based test methods – Glow-wire flammability test method for end-products (GWEPT)*

IEC 60947-2:2016, *Low-voltage switchgear and controlgear – Part 2: Circuit-breakers*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 60050-441, and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

3.1 Devices

3.1.1

switching device

device designed to make or break the current in one or more electric circuits

[SOURCE: IEC 60050-441:2000, 441-14-01]

3.1.2

mechanical switching device

switching device designed to close and open one or more electric circuits by means of separable contacts

[SOURCE: IEC 60050-441:2000, 441-14-02, modified – The note has been deleted.]

3.1.3

fuse

device that, by the fusing of one or more of its specially designed and proportioned components, opens the circuit in which it is inserted and breaks the current when this exceeds a given value for a sufficient time

[SOURCE: IEC 60050-441:2000, 441-18-01, modified – The end of the definition has been changed.]

3.1.4

circuit-breaker

mechanical switching device, capable of making, carrying and breaking currents under normal circuit conditions and also making, carrying for a specified time, and automatically breaking currents under specified abnormal circuit conditions such as those of short-circuit

[SOURCE: IEC 60050-441:2000, 441-14-20, modified – "automatically" has been added.]

3.1.5

plug-in circuit-breaker

circuit-breaker having one or more plug-in terminals and designed for use with appropriate means for the plug-in connection

Note 1 to entry: See 3.3.10.8.

3.2 General terms

3.2.1

overcurrent

current exceeding the rated current

[SOURCE: IEC 60050-441:2000, 441-11-06]

3.2.2

overload current

overcurrent occurring in an electrically undamaged circuit

Note 1 to entry: An overload current may cause damage if sustained for a sufficient time.

3.2.3

short-circuit current

overcurrent resulting from a fault of negligible impedance between points intended to be at different potentials in normal service

Note 1 to entry: A short-circuit current may result from a fault or from an incorrect connection.

3.2.4

main circuit

all the conductive parts of a circuit-breaker included in the circuit which it is designed to close and open

3.2.5

control circuit

circuit (other than a path of the main circuit) intended for the closing operation or opening operation, or both, of the circuit-breaker

3.2.6

auxiliary circuit

all the conductive parts of a circuit-breaker intended to be included in a circuit other than the main circuit and the control circuit of the circuit-breaker

3.2.7

pole

that part of a circuit-breaker associated exclusively with one electrically separated conducting path of its main circuit provided with contacts intended to connect and disconnect the main circuit itself and excluding those portions which provide a means for mounting and operating the poles together

3.2.7.1

protected pole

pole provided with an overcurrent release

Note 1 to entry: See 3.3.6.

3.2.7.2

mid-point

common point between two symmetrical circuit elements the opposite ends of which are electrically connected to different line conductors of the same circuit

[SOURCE: IEC 60050-826:2004, 826-14-04]

3.2.7.3

mid-point conductor

conductor electrically connected to the mid-point and capable of contributing to the distribution of electric energy

[SOURCE: IEC 60050-826:2004, 826-14-08]

3.2.7.4

M-pole

pole intended to be connected to the mid-point conductor

3.2.8

closed position

position in which the predetermined continuity of the main circuit of the circuit-breaker is secured

3.2.9

open position

position in which the predetermined clearance between open contacts in the main circuit of the circuit-breaker is secured

3.2.10

air temperature

3.2.10.1

ambient air temperature

temperature, determined under prescribed conditions, of the air surrounding the circuit-breaker

Note 1 to entry: For circuit breakers installed inside an enclosure, it is the temperature of the air outside the enclosure.

[SOURCE: IEC 60050-441:2000, 441-11-13, modified – "circuit breakers" is used instead of the generic term.]

3.2.10.2**A11 reference calibration temperature**

calibration temperature on which the time-current characteristics are based A11

3.2.11**operation**

transfer of the moving contact(s) from the open position to the closed position or vice versa

Note 1 to entry: If distinction is necessary, an operation in the electrical sense (make or break) is referred to as a "switching operation" and an operation in the mechanical sense (close or open) is referred to as a "mechanical operation".

3.2.12**operating cycle**

succession of operations from one position to another and back to the first position

3.2.13**operating sequence**

<of a mechanical switching device> succession of specified operations with specified time intervals

[SOURCE: IEC 60050-441:2000, 441-16-03]

3.2.14**uninterrupted duty**

duty in which the main contacts of a circuit-breaker remain closed whilst carrying a steady current without interruption for long periods (which could be weeks, months, or even years)

3.2.15**in-rush current**

transient current associated with energizing of transformers, cables, capacitor loads, etc.

[SOURCE: IEC 60050-448:1995, 448-11-30, modified – "reactors" has been changed to "capacitor loads".]

A11 3.2.16**type test**

test of one or more devices made to a certain design to show that the design meets certain requirements

[SOURCE: IEC 60050-411:1996, 411-53-01, modified]

3.2.17**routine test**

test to which each individual device is subjected during or after manufacture to ascertain whether it complies with certain criteria

[SOURCE: IEC 411-53-02, modified] A11

3.3 Constructional elements**3.3.1****main contact**

contact included in the main circuit of a circuit-breaker and intended to carry in the closed position the current of the main circuit

3.3.2**arcing contact**

contact on which the arc is intended to be established

Note 1 to entry: An arcing contact may serve as a main contact. It may also be a separate contact so designed that it opens after and closes before another contact, which it is intended to protect from damage.

[SOURCE: IEC 60050-441:2000, 441-15-08, modified – In the note, "injury" has been changed to "damage".]

3.3.3

control contact

contact included in a control circuit of a circuit-breaker and mechanically operated by the circuit-breaker

3.3.4

auxiliary contact

contact included in an auxiliary circuit and mechanically operated by the circuit-breaker (e.g. for indicating the position of the contacts)

3.3.5

release

device, mechanically connected to (or integrated into) a circuit-breaker, which releases the holding means and permits the automatic opening of the circuit-breaker

3.3.6

overcurrent release

release which causes a circuit-breaker to open, with or without time-delay, when the current in the release exceeds a pre-determined value

Note 1 to entry: In some cases, this value can depend upon the rate of rise of current.

3.3.7

overload release

overcurrent release intended for protection against overloads

3.3.8

conductive part

part which is capable of conducting current although it may not necessarily be used for carrying current in normal service

3.3.9

exposed conductive part

conductive part which can be readily touched and which normally is not live, but which may become live under fault conditions

Note 1 to entry: Typical exposed conductive parts are walls of metal enclosures, metal operating handles, etc.

3.3.10

terminal

conductive part of a device, provided for re-usable electrical connection to external circuits

3.3.10.1

screw-type terminal

terminal for the connection and subsequent disconnection of a conductor or the inter-connection of two or more conductors, capable of being dismantled, the connection being made, directly or indirectly, by means of screws or nuts of any kind

3.3.10.2

pillar terminal

screw-type terminal in which the conductor is inserted into a hole or cavity, where it is clamped under the shank of the screw(s)

Note 1 to entry: The clamping pressure can be applied directly by the shank of the screw or through an intermediate clamping element to which pressure is applied by the shank of the screw.

Note 2 to entry: Examples of pillar terminals are shown in Annex D, Figure D.1.

[SOURCE: IEC 60050-442:1998, 442-06-22, modified – In Note 1 to entry, "part" has been changed to "clamping element" and Note 2 to entry has been added.]

3.3.10.3 **screw terminal**

terminal in which the conductor is clamped under the head of the screw and where the clamping pressure can be applied directly by the head of the screw or through an intermediate part, such as a washer, a clamping plate or an anti-spread device

Note 1 to entry: Examples of screw terminals are shown in Annex D, Figure D.2.

3.3.10.4 **stud terminal**

screw-type terminal in which the conductor is clamped under a nut

Note 1 to entry: The clamping pressure can be applied directly by a suitably shaped nut or through an intermediate part, such as a washer, a clamping plate or an anti-spread device.

Note 2 to entry: Examples of stud terminals are shown in Annex D, Figure D.2.

[SOURCE: IEC 60050-442:1998, 442-06-23, modified – Note 2 to entry has been added.]

3.3.10.5 **saddle terminal**

screw-type terminal in which the conductor is clamped under a saddle by means of two or more screws or nuts

Note 1 to entry: Examples of saddle terminals are shown in Annex D, Figure D.3.

[SOURCE: IEC 60050-442:1998, 442-06-09, modified – "Terminal" has been changed to "screw-type terminal" and Note 1 to entry has been added.]

3.3.10.6 **lug terminal**

screw terminal or stud terminal, designed for clamping a cable lug or a bar directly or indirectly by means of a screw or nut

Note 1 to entry: Examples of lug terminals are shown in Annex D, Figure D.4.

[SOURCE: IEC 60050-442:1998, 442-06-16, modified – "Screw-type terminal" has been changed to "screw terminal or stud terminal" and Note 1 to entry has been added.]

3.3.10.7 **screwless terminal**

connecting terminal for the connection and subsequent disconnection of one conductor or the interconnection of two or more conductors capable of being dismantled, the connection being made, directly or indirectly, by means of springs, wedges, eccentrics or cones, etc., without special preparation of the conductor other than removal of insulation

[SOURCE: IEC 60050-442:1998, 442-06-13, modified – The term defined has been changed from "screwless-type clamping unit" to "screwless terminal", "clamping unit" has been changed to "connecting terminal" and the last part of the text has been added.]

3.3.10.8

plug-in terminal

terminal the electrical connection and disconnection of which can be effected without displacing the conductors of the corresponding circuit

Note 1 to entry: The connection is effected without the use of a tool and is provided by the resilience of the fixed and/or moving parts and/or by springs.

3.3.11

tapping screw

screw manufactured from a material having a greater resistance to deformation when applied by rotary insertion to a hole in a material having a lesser resistance to deformation

Note 1 to entry: The screw is made with a tapered thread, the taper being applied to the core diameter of the thread at the end section of the screw.

Note 2 to entry: The thread produced by application of the screw is formed securely only after sufficient revolutions have been made to exceed the number of threads on the tapered section.

3.3.11.1

thread-forming tapping screw

tapping screw having an uninterrupted thread

Note 1 to entry: It is not a function of this thread to remove material from the hole.

Note 2 to entry: An example of thread-forming tapping screw is shown in Figure 1.

3.3.11.2

thread-cutting tapping screw

tapping screw having an interrupted thread, the thread being intended to remove material from the hole

Note 1 to entry: An example of thread-cutting tapping screw is shown in Figure 2.

3.4 Conditions of operation

3.4.1

closing operation

operation by which the circuit-breaker is brought from the open position to the closed position

3.4.2

opening operation

operation by which the circuit-breaker is brought from the closed position to the open position

3.4.3

dependent manual operation

operation solely by means of directly applied manual energy, such that the speed and force of the operation are dependent upon the action of the operator

[SOURCE: IEC 60050-441:2000, 441-16-13]

3.4.4

independent manual operation

stored energy operation where the energy originates from manual power, stored and released in one continuous operation, such that the speed and force of the operation are independent of the action of the operator

[SOURCE: IEC 60050-441:2000, 441-16-16]

3.4.5

trip-free circuit-breaker

circuit-breaker, the moving contacts of which return to and remain in the open position when the automatic opening operation is initiated after the initiation of the closing operation, even if the closing command is maintained

Note 1 to entry: To ensure proper breaking of the current which may have been established, it may be necessary that the contacts momentarily reach the closed position.

3.4.6

DC ripple factor

ratio of half the difference between the maximum and minimum value to the mean value of a pulsating direct current

Note 1 to entry: With low values of the DC ripple factor this quantity is approximately equal to the ratio of the difference to the sum of the maximum and the minimum values.

[SOURCE: IEC 60050-551:1998, 551-17-29, modified – "of a pulsating direct current to the mean value of this current" has been changed to "to the mean value of a pulsating direct current".]

3.5 Characteristic quantities

3.5.1

rated value

stated value of any one of the characteristic quantities that serve to define the working conditions for which the circuit-breaker is designed and built

3.5.2

prospective current

current that would flow in the circuit if each pole of the circuit-breaker were replaced by a conductor of negligible impedance

Note 1 to entry: The prospective current may be qualified in the same manner as an actual current, for example prospective breaking current, prospective peak current.

[SOURCE: IEC 60050-441:2000, 441-17-01, modified – "circuit breakers" is used instead of the generic term and the Note to entry has been changed.]

3.5.3

prospective peak current

peak value of a prospective current during the transient period following initiation

Note 1 to entry: The definition assumes that the current is established by an ideal circuit-breaker, that is, with instantaneous transition from infinite to zero impedance. For circuits where the current can follow several different paths, for example polyphase circuits, it further assumes that the current is established simultaneously in all poles, even if the current in only one pole is considered.

[SOURCE: IEC 60050-441:2000, 441-17-02, modified – "switching device" has been changed to "circuit-breaker" and "made" has been changed to "established".]

3.5.4

maximum prospective peak current

prospective peak current when the initiation of the current takes place at the instant which leads to the highest possible value

Note 1 to entry: For a multipole circuit-breaker in a polyphase circuit, the maximum prospective peak current refers to a single pole only.

[SOURCE: IEC 60050-441:2000, 441-17-04, modified – In the note, "device" has been changed to "circuit breaker".]

3.5.5

short-circuit making and breaking capacity

prospective current which the circuit-breaker is designed to make, to carry for its opening time and to break under specified conditions

3.5.5.1

ultimate short-circuit breaking capacity

breaking capacity for which the specified conditions according to a specified test sequence do not include the capability of the circuit-breaker to carry 0,85 times its non-tripping current for the conventional time

3.5.5.2

service short-circuit breaking capacity

breaking capacity for which the specified conditions according to a specified test sequence include the capability of the circuit-breaker to carry 0,85 times its non-tripping current for the conventional time

3.5.6

breaking current

current in a pole of a circuit-breaker at the instant of initiation of the arc during a breaking operation

3.5.7

applied voltage

voltage which exists across the terminals of a pole of a circuit-breaker just before the making of the current

Note 1 to entry: This definition refers to a single-pole device. For a multipole device, the applied voltage is the voltage across the supply terminals of the device.

3.5.8

recovery voltage

voltage which appears across the terminals of a pole of a circuit-breaker after the breaking of the current

Note 1 to entry: This voltage may be considered in two successive intervals of time, one during which a transient voltage exists, followed by a second one during which the steady-state recovery voltage alone exists.

Note 2 to entry: This definition refers to a single-pole device. For a multipole device, the recovery voltage is the voltage across the supply terminals of the device.

[SOURCE: IEC 60050-441:2000, 441-17-25, modified – modified: "switching device" has been changed to "circuit-breaker", "power frequency" has been deleted in Note 1 to entry and, Note 2 to entry has been added.]

3.5.8.1

transient recovery voltage

recovery voltage during the time in which it has a significant transient character

Note 1 to entry: The transient recovery voltage may be oscillatory or non-oscillatory or a combination of these, depending on the characteristics of the circuit and of the circuit-breaker.

[SOURCE: IEC 60050-441:2000, 441-17-26, modified – The second sentence of Note 1 to entry has been deleted and Note 2 to entry has been deleted.]

3.5.9

opening time

time measured from the instant at which, the circuit-breaker being in the closed position, the current in the main circuit reaches the operating value of the overcurrent release to the instant when the arcing contacts have separated in all poles

Note 1 to entry: The opening time is commonly referred to as tripping time, although, strictly speaking, tripping time applies to the time between the instant of initiation of the opening time and the instant at which the opening command becomes irreversible.

3.5.10 **arcing time**

3.5.10.1 **arcing time of a pole**

interval of time between the instant of initiation of the arc in a pole and the instant of final arc extinction in that pole

[SOURCE: IEC 60050-441:2000, 441-17-37, modified – “or a fuse” and “or that fuse” have been deleted.]

3.5.10.2 **arcing time of a multipole circuit-breaker**

interval of time between the instant of first initiation of an arc and the instant of final extinction in all poles

[SOURCE: IEC 60050-441:2000, 441-17-38, modified – “final arc extinction” has been changed to “final extinction”.]

3.5.11 **time constant**

rise time $T = L/R$ (ms) of a prospective direct current to reach a value of 0,632 times the maximum peak current

3.5.12 **break time**

interval of time between the beginning of the opening time of a circuit-breaker and the end of the arcing time

3.5.13 **Joule integral** I^2t

integral of the square of the current over a given time interval

$$I^2t = \int_{t_0}^{t_1} i^2 dt$$

3.5.14 **I^2t characteristic of a circuit-breaker**

curve giving the maximum values of I^2t as a function of the prospective current under stated conditions of operation

3.5.15 **co-ordination between overcurrent protective devices in series**

3.5.15.1 **overcurrent protective co-ordination of overcurrent protective devices**

co-ordination of two or more overcurrent protective devices in series to ensure overcurrent (selectivity) and/or back-up protection

[SOURCE: IEC 60947-1:2007, 2.5.22]

3.5.15.2

overcurrent selectivity

co-ordination of the operating characteristics of two or more overcurrent protective devices in series such that, on the incidence of overcurrents within stated limits, the device intended to operate within these limits does so, while the other(s) does (do) not

[SOURCE: IEC 60947-1:2007/AMD2:2014, 2-5-23, modified – "in series" has been added and the note has been deleted.]

3.5.15.3

back-up protection

overcurrent co-ordination of two overcurrent protective devices in series, where the protective device, generally but not necessarily on the supply side, effects the overcurrent protection with or without the assistance of the other protective device and prevents excessive stress on the latter

[SOURCE: IEC 60947-1:2007, 2.5.24]

3.5.15.4

total selectivity

overcurrent selectivity where, in the presence of two overcurrent protective devices in series, the protective device on the load side effects the protection without causing the other protective device to operate

[SOURCE: IEC 60947-2:2016, 2.17.2]

3.5.15.5

partial selectivity

overcurrent selectivity where, in the presence of two overcurrent protective devices in series, the protective device on the load side effects the protection up to a given level of overcurrent, without causing the other protective device to operate

[SOURCE: IEC 60947-2:2016, 2.17.3]

3.5.15.6

selectivity limit current

I_s

current co-ordinate of the intersection between the total time-current characteristic of the protective device on the load side and the pre-arcing (for fuses), or tripping (for circuit-breakers) time-current characteristic of the other protective device

Note 1 to entry: The selectivity limit current (see Figure C.1) is a limiting value of current

- below which, in the presence of two overcurrent protective devices in series, the protective device on the load side completes its breaking operation in time to prevent the other protective device from starting its operation (i.e. selectivity is ensured);
- above which, in the presence of two overcurrent protective devices in series, the protective device on the load side may not complete its breaking operation in time to prevent the other protective device from starting its operation (i.e. selectivity is not ensured).

[SOURCE: IEC 60947-2:2016, 2.17.4]

3.5.15.7

take-over current

I_B

current co-ordinate of the intersection between the time-current characteristics of two overcurrent protective devices

Note 1 to entry: The take-over current is the current co-ordinate of the intersection between the maximum break-time/current characteristics of two overcurrent protective devices in series.

[SOURCE: IEC 60050-441:2000, 441-17-16, modified – Note 1 to entry has been added.]

3.5.15.8 **conditional short-circuit current**

<of a circuit or a switching device> prospective current that a circuit or a switching device, protected by a specified short-circuit protective device, can satisfactorily withstand for the total operating time of that device under specified conditions of use and behaviour

Note 1 to entry: For the purpose of this document, the short-circuit protective device is generally a circuit-breaker or a fuse.

Note 2 to entry: This definition differs from IEC 60050-441:2000, 441-17-20 by broadening the concept of current limiting device into a short-circuit protective device, the function of which is not only to limit the current.

[SOURCE: IEC 60947-1:2007, 2.5.29]

3.5.15.9 **rated conditional short-circuit current**

I_{nc}
value of prospective current, stated by the manufacturer, which the equipment, protected by a short-circuit protective device specified by the manufacturer, can withstand satisfactorily for the operating time of this device under the test conditions in the relevant product standard

Note 1 to entry: See IEC 60947-1:2007, 4.3.6.4.

3.5.16 **conventional non-tripping current**

I_{nt}
specified value of current which the circuit-breaker is capable of carrying for a specified time (conventional time) without tripping

3.5.17 **conventional tripping current**

I_t
specified value of current which causes the circuit-breaker to operate within a specified time (conventional time)

3.5.18 **instantaneous tripping current**

minimum value of current causing the circuit-breaker to operate automatically without intentional time-delay

3.6 Definitions related to insulation co-ordination

3.6.1 **insulation coordination**

mutual correlation of insulation characteristics of electrical equipment taking into account the expected micro-environment and the influencing stresses

[SOURCE: IEC 60664-1:2007, 3.1, modified – "other influencing stresses" has been changed to "the influencing stresses" and the note has been deleted.]

3.6.2 **working voltage**

voltage across any particular insulation which can occur when the equipment is supplied at rated voltage

Note 1 to entry: Transients are disregarded.

Note 2 to entry: Both open-circuit conditions and normal operating conditions are taken into account

[SOURCE: IEC 60664-1:2007, 3.5, modified – "highest r.m.s. value of the a.c. or d.c. voltage across " has been replaced by "voltage across".]

3.6.3

overvoltage

any voltage having a peak value exceeding the corresponding peak value of maximum steady-state voltage at normal operating conditions

[SOURCE: IEC 60664-1:2007, 3.7]

3.6.4

impulse withstand voltage

highest peak value of impulse voltage of prescribed form and polarity which does not cause breakdown of the insulation under specific conditions

[SOURCE: IEC 60664-1:2007, 3.8.1, modified – "specified" has been replaced by "specific".]

3.6.5

overvoltage category

numeral defining a transient overvoltage condition

[SOURCE: IEC 60664-1:2007, 3.10, modified – The notes have been deleted.]

3.6.6

macro-environment

environment of the room or other location, in which the equipment is installed or used

[SOURCE: IEC 60664-1:2007, 3.12.1]

3.6.7

micro-environment

immediate environment of the insulation which particularly influences the dimensioning of the creepage distances

[SOURCE: IEC 60664-1:2007, 3.12.2]

3.6.8

pollution

any addition of foreign matter, solid, liquid or gaseous that can result in a reduction of electric strength or surface resistivity of the insulation

[SOURCE: IEC 60664-1:2007, 3.11]

3.6.9

pollution degree

numeral characterising the expected pollution of the micro-environment

Note 1 to entry: The pollution degree to which equipment is exposed may be different from that of the macro-environment where the equipment is located because of protection offered by means such as an enclosure or internal heating to prevent absorption or condensation of moisture.

[SOURCE: IEC 60664-1:2007, 3.13, modified – Note 1 to entry replaces the existing note.]

3.6.10

isolation

isolating function

function intended to cut off the supply from all or a discrete section of the installation by separating the installation from every source of electrical energy for reasons of safety

[SOURCE: IEC 60947-1:2007, 2.1.19]

3.6.11

isolating distance

clearance between open contacts of a pole of a mechanical switching device, meeting the safety requirements specified for isolation purposes

[SOURCE: IEC 60050-441:2000, 441-17-35, modified – "disconnectors" has been changed to "isolation purposes".]

3.6.12

clearance

shortest distance in air between two conductive parts along a string stretched the shortest way between these conductive parts

Note 1 to entry: For the purpose of determining a clearance to accessible parts, the accessible surface of an insulating enclosure is considered conductive as if it was covered by a metal foil wherever it can be touched by a hand or a standard test finger according to Figure 8.

Note 2 to entry: See Annex A.

[SOURCE: IEC 60050-441:2000, 441-17-31, modified – "the distance" has been changed to "shortest distance in air" and the notes have been added.]

3.6.13

creepage distance

shortest distance along the surface of an insulating material between two conductive parts

Note 1 to entry: See Annex A.

Note 2 to entry: For the purpose of determining a creepage distance to accessible parts, the accessible surface of an insulating enclosure is considered conductive as if it was covered by a metal foil wherever it can be touched by a hand or a standard test finger according to Figure 8.

[SOURCE: IEC 60050-151:2001, 151-15-50, modified – "solid" has been deleted from "insulating material" and the Notes to entry have been added.]

4 Classification

4.1 General

Circuit-breakers are classified according to several criteria.

4.2 According to the number of poles

- single-pole circuit-breakers;
- two-pole circuit-breakers with two protected poles;
- three-pole circuit-breakers with two protected poles and non-polarized protected M pole.

NOTE 1 The non-polarized M-pole of three-pole circuit-breaker with two protected poles can consist of two polarized factory pre-wired poles.

NOTE 2 Three pole circuit-breakers are intended to protect a distribution system with 2 polarities and a mid-point. See Table 1.

NOTE 3 A pole of a non-polarized breaker can consist of two polarized factory pre-wired poles.

4.3 According to the current direction through the poles

- polarized circuit breaker;
- non-polarized circuit breaker.

4.4 According to the protection against external influences

- enclosed-type (not requiring an appropriate enclosure);
- unenclosed-type (for use with an appropriate enclosure).

4.5 According to the method of mounting

- surface-type;
- flush-type;
- panel board type, also referred to as distribution board type.

NOTE These types can be intended to be rail mounted.

4.6 According to the methods of connection**4.6.1 According to the fixation system**

- circuit-breakers, the electrical connections of which are not associated with the mechanical mounting;
- circuit-breakers, the electrical connections of which are associated with the mechanical mounting.

NOTE Examples of this type are:

- plug-in type;
- bolt-on type;
- screw-in type.

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

4.6.2 According to the type of terminals

- circuit-breakers with screw-type terminals for external copper conductors;
- circuit-breakers with screwless type terminals for external copper conductors;

NOTE 1 The requirements for circuit-breakers equipped with this type of terminals are given in [A11](#) Annex H. [A11](#)

- circuit-breakers with flat quick-connect terminals for external copper conductors;

NOTE 2 The requirements for circuit-breakers equipped with this type of terminals are given in [A11](#) Annex I. [A11](#)

4.7 According to the instantaneous tripping current (see 3.5.18)

- B-type;
- C-type.

NOTE 1 The selection of a particular type can depend on the installation rules.

NOTE 2 In China, other ranges of instantaneous tripping defined by the manufacturer are allowed.

5 Characteristics of circuit-breakers**5.1 List of characteristics**

The characteristics of a circuit-breaker shall be stated in the following terms:

- number of poles (see 4.2);
- current direction (see 4.3)
- protection against external influences (see 4.4);
- method of mounting (see 4.5);
- method of connection (see 4.6);
- value of rated operational voltage (see 5.2.1.1);
- value of rated direct current (see 5.2.2);
- range of instantaneous tripping current (see 4.7 and 5.3.4);

- value of rated short-circuit capacity (see 5.3.3);
- I^2t characteristic (see 3.5.14).

5.2 Rated quantities

5.2.1 Rated voltages

5.2.1.1 Rated operational voltage (U_e)

The rated operational voltage (hereinafter referred to as rated voltage) of a circuit-breaker is the value of voltage, assigned by the manufacturer, to which its performance (particularly the short-circuit performance) is referred.

NOTE The same circuit-breaker can be assigned a number of rated voltages and associated rated short-circuit capacities.

5.2.1.2 Rated insulation voltage (U_i)

The rated insulation voltage of a circuit-breaker is the value of voltage, assigned by the manufacturer, to which dielectric test voltages and creepage distances are referred.

Unless otherwise stated, the rated insulation voltage is the value of the maximum rated voltage of the circuit-breaker. In no case shall the maximum rated voltage exceed the rated insulation voltage.

5.2.1.3 Rated impulse withstand voltage (U_{imp})

A11 The rated impulse withstand voltage (U_{imp}) of a circuit-breaker is the value of voltage, assigned by the manufacturer, to which impulse test voltages and clearances are referred. The rated impulse withstand voltage of a circuit-breaker shall be equal to or higher than the standard value of rated impulse withstand voltage given in 5.3.5.

NOTE For dimensioning of clearances, for rated impulse withstand voltages higher than the standard value of rated OTE impulse withstand voltage given in 5.3.5, see EN IEC 60664-1. **A11**

5.2.2 Rated direct current (I_n)

A rated direct current is the direct current assigned by the manufacturer as the current which the circuit-breaker is designed to carry in uninterrupted duty (see 3.2.14), at a specified reference ambient air temperature.

A11 The reference calibration temperature is 30 °C. If a different reference calibration temperature for the circuit-breaker is used, the effect on the overload protection of cables shall be taken into account, since this is also based on an ambient temperature of 30 °C, according to installation rules (see Clause 523 of HD 60364-5-52:2011). **A11**

5.2.3 Rated short-circuit capacity (I_{cn})

The rated short-circuit capacity of a circuit-breaker is the value of the ultimate short-circuit breaking capacity (see 3.5.5.1) assigned to that circuit-breaker by the manufacturer.

NOTE A circuit-breaker having a given rated short-circuit capacity has a corresponding service short-circuit capacity (I_{cs}) (see Table 16).

5.2.4 Rated making and breaking capacity of an individual pole (I_{cn1})

The value is the limiting short-circuit making and breaking capacity on each individual protected pole of multipole circuit breakers.

The value of prospective short-circuit current is assigned by the manufacturer on one pole of a two-pole circuit breaker, which the device is designed to make, to carry for its opening time and to break under specified conditions

The standard values are those given in 5.3.3.

5.3 Standard and preferred values

5.3.1 Preferred values of rated voltage

The preferred values of rated voltages are given in Table 1.

Table 1 – Preferred values of rated voltage and corresponding supply systems

Circuit breaker	Single pole	Single pole	Two pole	Two pole	Three pole with non-polarized M-pole
Rated voltage of circuit-breaker V	200	200	200	400	400
Maximum supply system voltages V	2-wires 200	3-wires 200/400	2-wires 200	3-wires 200/400	3-wires 200/400
Maximum line to line voltage for IT-systems ^a V	200	200	200	200	200

^a If not otherwise specified by the manufacturer.

NOTE The minimum voltage for which the circuit breaker is designed can be declared by the manufacturer in its documentations.

5.3.2 Preferred values of rated current

Preferred values of rated current are:

6 A, 8 A, 10 A, 13 A, 16 A, 20 A, 25 A, 32 A, 40 A, 50 A, 63 A, 80 A, 100 A and 125 A.

5.3.3 Values of rated short-circuit capacity

Standard values of rated short-circuit capacities up to and including 10 000 A are:

1 500 A, 3 000 A, 4 500 A, 6 000 A, 10 000 A.

NOTE The values of 1 000 A, 2 000 A, 2 500 A, 5 000 A, 7 500 A and 9 000 A are also considered as standard in some countries.

5.3.4 Standard ranges of instantaneous tripping

The ranges of instantaneous tripping are given in Table 2.

Table 2 – Ranges of instantaneous tripping

Type	Range for DC
B	Above 4 I up to and including 7 I
C	Above 7 I up to and including 15 I

5.3.5 Standard value of rated impulse withstand voltage (U_{imp})

The standard value of the rated impulse withstand voltage (U_{imp}) is 4 kV.



6 Marking and other product information

A11 6.1 Standards markings **A11**

Each circuit-breaker shall be marked in a durable manner with the following:

- a) manufacturer's name or trade mark;
- b) type designation, catalogue number or serial number;
- c) rated voltage with the symbol — — — ;
- d) maximum line-to-line voltage for application in IT systems;
- e) rated current without symbol "A", preceded by the symbol of instantaneous tripping (B or C), for example B16;
- f) marking of polarity, if required (e.g. +, -, M);
- g) **A11** rated short-circuit capacity for DC in amperes, within a rectangle, without symbol "A"; **A11**
- h) wiring diagram, unless the correct mode of connection is evident;
- i) **A11** reference calibration temperature, if different from 30 °C; **A11**
- j) degree of protection (only if different from IP20);
- k) making and breaking capacity of an individual protected pole of multipole circuit breakers (I_{cn1}), if different from I_{cn} ;
- A11** l) Indication of grid distance "a" according to 9.12.9.2, if different from 35 mm;
- m) Circuit-breaker installation information related to the grid distance "a" if different from 35 mm or if requiring additional barrier(s) to achieve the grid distance "a".

If, for small devices, the space available does not allow all the above data to be marked, at least the information under e) and f), if required, shall be marked and visible when the circuit-breaker is installed.

The information under a), b), c), d), g), h) and k) may be marked on the side or on the back of the device and be visible only before the device is installed. **A11**

Alternatively, the information under h) may be on the inside of any cover which has to be removed in order to connect the supply wires. Any remaining information not marked shall be given in the manufacturer's literature.

The information under f) shall be placed near the corresponding terminals and visible from the front.

The suitability for isolation, which is provided by all circuit-breakers of this document, may be indicated by the symbol  on the device. When affixed, this marking may be included in a wiring diagram, where it may be combined with symbols of other functions, for example overload protection, or other symbols of technical committee 3 of IEC. When the symbol is used on its own (i.e. not in a wiring diagram), combination with symbols of other functions is not allowed.

A11 *Text deleted.* **A11**

If a degree of protection higher than IP20 according to IEC 60529 is marked on the device, it shall comply with it, whichever the method of installation. If the higher degree of protection is obtained only by a specific method of installation and/or with the use of specific accessories (e.g. terminal covers, enclosures), this shall be specified in the manufacturer's literature.

A11 Text deleted. **A11**

A11 The manufacturer shall provide the I²t characteristic (see 3.5.14). **A11**

For circuit-breakers other than those operated by means of push-buttons, the open position shall be indicated by the symbol O (a circle) IEC 60417-5008:2002-10 and the closed position by the symbol I (a short vertical straight line) IEC 60417-5007:2002-10. Additional national symbols for this indication are allowed. Provisionally, the use of this national indication alone is allowed. These indications shall be readily visible when the circuit-breaker is installed.

For circuit-breakers operated by means of two push-buttons, only the push-button designed for the opening operation shall be red and/or be marked with the symbol O IEC 60417-5008:2002-10.

Red shall not be used for any other push-button of the circuit-breaker.

If a push-button is used for closing the contacts and is clearly identified as such, its depressed position is sufficient to indicate the closed position.

If a single push-button is used for closing and opening the contacts and is identified as such, the button remaining in its depressed position is sufficient to indicate the closed position. On the other hand, if the button does not remain depressed, an additional means indicating the position of the contacts shall be provided.

For circuit-breakers with multiple current ratings, the maximum value shall be marked in accordance with marking e), and in addition the value for which the circuit-breaker is adjusted shall be indicated without ambiguity.

If it is necessary to distinguish between the supply and the load terminals, the former shall be indicated by arrows pointing towards the circuit-breaker and the latter by arrows pointing away from the circuit-breaker.

Terminals intended for the protective conductor, if any, shall be indicated by the symbol  (IEC 60417-5019:2006-08).

Marking shall be indelible and easily legible, and shall not be placed on screws, washers or other removable parts.

A11 For rail mounting circuit-breakers, appropriate rail(s) shall be indicated in the manufacturer's documentation. **A11**

Compliance is checked by inspection and by the test of 9.3.

A11 6.2 Additional marking

Additional marking to other standards (EN or IEC or other) is allowed under the following conditions:

- the circuit-breaker shall comply with all the requirements of the additional standard;
- the relevant standard to which the additional marking refers shall be indicated adjacent to this marking and shall be clearly differentiated or separated from the standard marking according to 6.1.

Compliance is checked by inspection and by carrying out all the test sequences required by the relevant standard. Equivalent or less severe test sequences need not be repeated.

6.3 Guidance table for marking

Table Z.1 — Guidance table for marking

Marking and other product information		Markings on the MCB itself			Product information in catalogue
Each MCB shall be marked in a durable manner with all or, for small apparatus, part of the following data:		If, for small devices the space available does not allow all the above data to be marked, at least this information shall be marked and visible when the device is installed.	This information may be marked on the side or on the back of the device and be visible only before the device is installed.	Alternatively, the information may be on the inside of any cover which shall be removed in order to connect the supply wires.	Any remaining information not marked shall be given in the manufacturer's catalogues .
a)	manufacturer's name or trademark		X		
b)	type designation, catalogue number or serial number		X		
c)	rated voltage, with the symbol 		X		
d)	maximum line-to-line voltage for application in IT systems		X		
e)	rated current without symbol "A" preceded by the symbol of overcurrent instantaneous tripping (B or C), for example B 16	X			
f)	marking of polarity, if required (e.g. +, -, M)	X			
g)	rated short-circuit capacity for DC in a rectangle, in amperes, without symbol "A"		X		
h)	wiring diagram, unless the correct mode of connection is evident		X	X	
i)	reference calibration temperature, if different from 30 °C				X
j)	the degree of protection (only if different from IP20)				X
k)	making and breaking capacity of an individual protected pole of multipole circuit breakers (Icn1), if different from Icn.		X		
l)	Indication of grid distance "a" according to 9.12.9.2, if different from 35 mm				X
m)	Circuit-breaker installation information related to the grid distance "a" if different from 35 mm or if requiring additional barrier(s) to achieve the grid distance "a"				X