

BS EN 60947-3:2009+A2:2015

Incorporating corrigenda September 2012 and November 2013



BSI Standards Publication

Low-voltage switchgear and controlgear

Part 3: Switches, disconnectors, switch-disconnectors and fuse-combination units

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National foreword

This British Standard is the UK implementation of EN 60947-3:2009+A2:2015. It is identical to IEC 60947-3:2008, incorporating amendment 1:2012, amendment 2:2015 and corrigenda September 2012 and November 2013. It supersedes BS EN 60947-3:2009+A1:2012, which is withdrawn.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 UK participation in its preparation was entrusted by Technical Committee PEL/121, Switchgear and Controlgear and their assemblies for low voltage, to Subcommittee PEL/121/1, Low voltage switchgear and controlgear.

A list of organizations represented on this subcommittee can be obtained on request to its secretary.

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Published by BSI Standards Limited 2015

ISBN 978 0 580 82477 7

ICS 29.120.40; 29.130.20

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This British Standard was published under the authority of the Standards Policy and Strategy Committee on 31 July 2009

Amendments/corrigenda issued since publication

Date	Text affected
31 May 2012	Implementation of IEC amendment 1:2012 with CENELEC endorsement A1:2012
31 January 2013	Implementation of IEC corrigendum September 2012: 4.2.1, 4.2.2 and 4.2.3 deleted
30 April 2014	Implementation of IEC corrigendum November 2013: Updated reference and footnote for entry IEC 60947-1 in subclause 1.2
31 December 2015	Implementation of IEC amendment 2:2015 with CENELEC endorsement A2:2015: Annexes ZA and ZZ updated

**Low-voltage switchgear and controlgear -
Part 3: Switches, disconnectors, switch-disconnectors
and fuse-combination units
(IEC 60947-3:2008)**

Appareillage à basse tension -
Partie 3: Interrupteurs, sectionneurs,
interrupteurs-sectionneurs
et combinés-fusibles
(CEI 60947-3:2008)

Niederspannungsschaltgeräte -
Teil 3: Lastschalter, Trennschalter,
Lasttrennschalter
und Schalter-Sicherungs-Einheiten
(IEC 60947-3:2008)

This European Standard was approved by CENELEC on 2009-05-01. 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, Bulgaria, 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: Avenue Marnix 17, B - 1000 Brussels

Foreword

The text of document 17B/1601/FDIS, future edition 3 of IEC 60947-3, 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 60947-3 on 2009-05-01.

This European Standard supersedes EN 60947-3:1999 + A1:2001 + A2:2005.

EN 60947-3:2009 includes the following significant technical changes with respect to EN 60947-3:1999:

- alignment with EN 60947-1:2007;
- a switching operation without current allowed between making and breaking operation (Table 3);
- increased number of operations for AC-23 allowed with agreement of the manufacturer (Table 3);
- simplified test procedure amended, f) added to 8.3.2.1.3;
- temperature rise test shall be made at the rated operational current I_e instead of the conventional enclosed thermal current I_{the} (8.3.3.1).

This part is to be used in conjunction with EN 60947-1. The numbering of the subclauses is sometimes not continuous because it is based on EN 60947-1.

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) 2010-02-01
- latest date by which the national standards conflicting
with the EN have to be withdrawn (dow) 2012-05-01

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 (2004/108/EC). See Annex ZZ.

Annexes ZA and ZZ have been added by CENELEC.

Endorsement notice

The text of the International Standard IEC 60947-3:2008 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following note has to be added for the standard indicated:

IEC 60447 NOTE Harmonized as EN 60447:2004 (not modified).

Foreword amendment A1

The text of document 17B/1758/FDIS, future A1 to IEC 60947-3:2008, 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 approved by CENELEC as EN 60947-3:2009/A1:2012.

The following dates are fixed:

- latest date by which the document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2012-12-21
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2015-03-21

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

Endorsement notice

The text of the International Standard IEC 60947-3:2008/A1:2012 was approved by CENELEC as a European Standard without any modification.

Foreword to amendment A2

The text of document 121A/42/FDIS, future IEC 60947-3:2008/A2, prepared by SC 121A "Low-voltage switchgear and controlgear" of IEC/TC 121 "Switchgear and controlgear and their assemblies for low voltage" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 60947-3:2009/A2:2015.

The following dates are fixed:

- latest date by which the document has to be implemented at (dop) 2016-05-31
national level by publication of an identical national
standard or by endorsement
- latest date by which the national standards conflicting with (dow) 2018-08-31
the document have to be withdrawn

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

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

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

Endorsement notice

The text of the International Standard IEC 60947-3:2008/A2:2015 was approved by CENELEC as a European Standard without any modification.

In the Bibliography of EN 60947-3:2009, the following notes have to be added for the standards indicated:

IEC 60364-7-712:2002	NOTE	Harmonized as HD 60364-7-712:2005 (not modified).
IEC 60664-1	NOTE	Harmonized as EN 60664-1.

Annex ZA (normative)

Normative references to international publications with their corresponding European publications

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

NOTE 1 When 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>
IEC 60050-441	1984	International Electrotechnical Vocabulary (IEV) -	-	-
+ A1	2000	Chapter 441: Switchgear, controlgear and fuses	-	-
IEC 60269	series	Low-voltage fuses	EN 60269 HD 60269 CLC/TR 60269	series
IEC 60410	1973	Sampling plans and procedures for inspection by attributes	-	-
IEC 60417-DB	2002	Graphical symbols for use on equipment	-	-
IEC 60947-1	2007	Low-voltage switchgear and controlgear - Part 1: General rules	EN 60947-1	2007
+ A1	2010		+ A1	2011
+ A2	2014		+ A2	2014
IEC 60947-2	2006	Low-voltage switchgear and controlgear - Part 2: Circuit-breakers	EN 60947-2	2006
+ A1	2009		+ A1	2009
+ A2	2013		+ A2	2013
IEC 60947-4-1	2009	Low-voltage switchgear and controlgear - Part 4-1: Contactors and motor-starters - Electromechanical contactors and motor-starters	EN 60947-4-1	2010
+ A1	2012		+ A1	2012
IEC 60947-5-1	2003	Low-voltage switchgear and controlgear - Part 5-1: Control circuit devices and switching elements - Electromechanical control circuit devices	EN 60947-5-1	2004
-	-		+ corrigendum Nov.	2004
-	-		+ corrigendum Jul.	2005
+ A1	2009		+ A1	2009

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 61000-4-2	2008	Electromagnetic compatibility (EMC) - Part 4-2: Testing and measurement techniques - Electrostatic discharge immunity test	EN 61000-4-2	2009
IEC 61000-4-3	2006	Electromagnetic compatibility (EMC) - Part 4-3: Testing and measurement techniques - Radiated, radio-frequency, electromagnetic field immunity test	EN 61000-4-3	2006
+ A1	2007		+ A1	2008
-	-		+ IS	2009
+ A2	2010		+ A2	2010
IEC 61000-4-4	2012	Electromagnetic compatibility (EMC) - Part 4-4: Testing and measurement techniques - Electrical fast transient/burst immunity test	EN 61000-4-4	2012
IEC 61000-4-5	2014	Electromagnetic compatibility (EMC) - Part 4-5: Testing and measurement techniques - Surge immunity test	EN 61000-4-5	2014
IEC 61000-4-6	2013	Electromagnetic compatibility (EMC) - Part 4-6: Testing and measurement techniques - Immunity to conducted disturbances, induced by radio-frequency fields	EN 61000-4-6	2014
CISPR 11 (mod)	2009	Industrial, scientific and medical equipment - Radio-frequency disturbance characteristics - Limits and methods of measurement	EN 55011	2009
+ A1	2010		+ A1	2010
CISPR 22 (mod)	2008	Information technology equipment - Radio disturbance characteristics - Limits and methods of measurement	EN 55022	2010
-	-		+ AC	2011

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 protection requirements of Annex I Article 1 of the EU Directive 2004/108/EC.

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

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

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LOW-VOLTAGE SWITCHGEAR AND CONTROLGEAR ±

Part 3: Switches, disconnectors, switch-disconnectors and fuse-combination units

1 General

The provisions of the general rules dealt with in IEC 60947-1 are applicable to this part, where specifically called for. Clauses and subclauses, tables, figures and appendices of the general rules thus applicable are identified by reference IEC 60947-1, e.g., 4.3.4.1 of IEC 60947-1, Table 4 of IEC 60947-1, or Annex A of IEC 60947-1.

1.1 Scope and object

This part of IEC 60947 applies to switches, disconnectors, switch-disconnectors and fuse-combination units to be used in distribution circuits and motor circuits of which the rated voltage does not exceed 1 000 V a.c. or 1 500 V d.c.

The manufacturer shall specify the type, ratings and characteristics according to the relevant standard of any incorporated fuses.

This part does not apply to equipment coming within the scope of IEC 60947-2, IEC 60947-4-1 and IEC 60947-5-1; however, when switches and fuse-combination units coming into the scope of this part are normally used to start, accelerate and/or stop an individual motor they shall also comply with the additional requirements given in Annex A.

The requirements for single pole operated three pole switches are included in Annex C.

Auxiliary switches fitted to equipment within the scope of this part shall comply with the requirements of IEC 60947-5-1.

This part does not include the additional requirements necessary for electrical apparatus for explosive gas atmospheres.

NOTE 1 Depending on its design, a switch (or disconnector) can be referred to as "a rotary switch (disconnector)", "cam-operated switch (disconnector)", "knife-switch (disconnector)", etc.

NOTE 2 In this part, the word "switch" also applies to the apparatus referred to in French as "commutateurs", intended to modify the connections between several circuits and *inter alia* to substitute a part of a circuit for another.

NOTE 3 In general, throughout this part switches, disconnectors, switch-disconnectors and fuse-combination units will be referred to as "equipment".

The object of this part is to state

- a) the characteristics of the equipment;
- b) the conditions with which the equipment shall comply with reference to
 - 1) operation and behaviour in normal service;
 - 2) operation and behaviour in case of specified abnormal conditions, e.g. short circuit;
 - 3) dielectric properties;
- c) the tests for confirming that these conditions have been met and the methods to be adopted for these tests;

- d) the information to be marked on the equipment or made available by the manufacturer, e.g. in the catalogue.

1.2 Normative references

A2 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*
IEC 60050-441:1984/AMD1:2000

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

IEC 60410:1973, *Sampling plans and procedures for inspection by attributes*

IEC 60417-DB:2002¹, *Graphical symbols for use on equipment*

IEC 60947-1:2007, *Low-voltage switchgear and controlgear – Part 1: General rules*
IEC 60947-1:2007/AMD1:2010
IEC 60947-1:2007/AMD2:2014

IEC 60947-2:2006, *Low-voltage switchgear and controlgear – Part 2: Circuit-breakers*
IEC 60947-2:2006/AMD1:2009
IEC 60947-2:2006/AMD2:2013

IEC 60947-4-1:2009, *Low-voltage switchgear and controlgear – Part 4-1: Contactors and motor-starters – Electromechanical contactors and motor-starters*
IEC 60947-4-1:2009/AMD1:2012

IEC 60947-5-1:2003, *Low-voltage switchgear and controlgear – Part 5-1: Control circuit devices and switching elements – Electromechanical control circuit devices*
IEC 60947-5-1:2003/AMD1:2009

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

IEC 61000-4-3:2006, *Electromagnetic compatibility (EMC) – Part 4-3: Testing and measurement techniques – Radiated, radio-frequency, electromagnetic field immunity test*
IEC 61000-4-3:2006/AMD1:2007
IEC 61000-4-3:2006/AMD2:2010

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

IEC 61000-4-5:2014, *Electromagnetic compatibility (EMC) – Part 4-5: Testing and measurement techniques – Surge immunity test*

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

¹ “DB” refers to the IEC on-line database. **A2**

 CISPR 11:2009, *Industrial, scientific and medical equipment – Radio-frequency disturbance characteristics – Limits and methods of measurement*
CISPR 11:2009/AMD1:2010

CISPR 22:2008, *Information technology equipment – Radio disturbance characteristics – Limits and methods of measurement*

2 Terms, definitions and index of terms

2.1 General

For the purposes of this document, the terms and definitions given in IEC 60050-441 and IEC 60947-1 as well as the following apply.

2.2 Alphabetical index of terms

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2.3 Terms and definitions

2.3.1

disconnecter

mechanical switching device which, in the open position, complies with the requirements specified for the isolating function

Note 1 to entry: A disconnector is capable of opening and closing a circuit when either a negligible current is broken or made, or when no significant change in the voltage across the terminals of each of the poles of the disconnector occurs. It is also capable of carrying currents under normal circuit conditions and carrying, for a specified time, currents under abnormal conditions such as those of short-circuit.

[SOURCE: IEC 60050-441:1984, 441-14-05, modified – reference to isolating function instead of isolating distance] 

A2 2.3.2

fuse-combination unit

combination of a mechanical switching device and one or more fuses in a composite unit, assembled by the manufacturer or in accordance with his instructions

[SOURCE: IEC 60050-441:1984, 441-14-04]

2.3.3

switch-fuse

switch in which one or more poles have a fuse in series in a composite unit

[SOURCE: IEC 60050-441:1984, 441-14-14]

2.3.3.1

switch-fuse single opening

switch-fuse which provides an interruption in the circuit on one side of the fuse-link only

Note 1 to entry: With this arrangement safety precautions may be necessary when removing fuse-links.

2.3.3.2

switch-fuse double opening

switch-fuse which provides an interruption in the circuit on both sides of the fuse-link

Note 1 to entry: With this arrangement safety precautions may be necessary when removing fuse-links.

2.3.4

fuse-switch

switch in which a fuse-link or fuse-carrier with fuse-link forms the moving contact

[SOURCE: IEC 60050-441:1984, 441-14-17]

2.3.4.1

fuse-switch single opening

fuse-switch which provides an interruption in the circuit on one side of the fuse-link only

Note 1 to entry: With this arrangement, safety precautions may be necessary when removing fuse-links.

2.3.4.2

fuse-switch double opening

fuse-switch which provides an interruption in the circuit on both sides of the fuse-link

NOTE 1 to entry: With this arrangement, safety precautions may be necessary when removing fuse-links.

2.3.5

disconnecter-fuse

disconnecter in which one or more poles have a fuse in series in a composite unit

[SOURCE: IEC 60050-441:1984, 441-14-15]

2.3.5.1

disconnecter-fuse single opening

disconnecter-fuse which provides an opening in the circuit on at least one side of the fuse-link, that satisfies the requirements specified for the isolating function

Note 1 to entry: With this arrangement, safety precautions may be necessary when removing fuse-links.

2.3.5.2

disconnecter-fuse double opening

disconnecter-fuse which provides an opening in the circuit that satisfies the requirements specified for the isolating function on both sides of the fuse-link 

A2 2.3.6

fuse-disconnector

disconnecter in which a fuse-link or fuse-carrier with fuse-link forms the moving contact

[SOURCE: IEC 60050-441:1984, 441-14-18]

2.3.6.1

fuse-disconnector single opening

fuse-disconnector which provides an opening in the circuit on at least one side of the fuse-link that satisfies the requirements specified for the isolating function

Note 1 to entry: With this arrangement, safety precautions may be necessary when removing fuse-links.

2.3.6.2

fuse-disconnector double opening

fuse-disconnector which provides an opening in the circuit, that satisfies the requirements specified for the isolating function, on both sides of the fuse-link

2.3.7

switch-disconnector-fuse

switch-disconnector in which one or more poles have a fuse in series in a composite unit

[SOURCE: IEC 60050-441:1984, 441-14-16]

2.3.7.1

switch-disconnector-fuse single opening

switch-disconnector-fuse which provides an interruption in the circuit on at least one side of the fuse-link that satisfies the requirements specified for the isolating function

Note 1 to entry: With this arrangement, safety precautions may be necessary when removing fuse-links.

2.3.7.2

switch-disconnector-fuse double opening

switch-disconnector-fuse which provides an interruption in the circuit on both sides of the fuse-link that satisfies the requirements specified for the isolating function

2.3.8

fuse-switch-disconnector

switch-disconnector in which a fuse-link or fuse-carrier with fuse-link forms the moving contact

[SOURCE: IEC 60050-441:1984, 441-14-19]

2.3.8.1

fuse-switch-disconnector single opening

fuse-switch-disconnector which provides an interruption in the circuit on at least one side of the fuse-link that satisfies the requirements specified for the isolating function

Note 1 to entry: With this arrangement, safety precautions may be necessary when removing fuse-links.

2.3.8.2

fuse-switch-disconnector double opening

fuse-switch-disconnector which provides an interruption in the circuit on both sides of the fuse-link that satisfies the requirements specified for the isolating function

2.3.9

single pole operated three pole device

mechanical unit consisting of three individually operable single pole switches and/or disconnecting units according to this part, rated as a complete unit for use in a three-phase system **A2**

A2 Note 1 to entry: These mechanical units are intended for power distribution systems where switching and/or isolation of an individual phase may be necessary and they should not be used for the switching of the primary circuit of three-phase equipment.

2.3.10

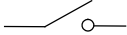
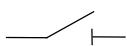
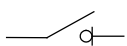
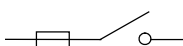
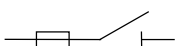
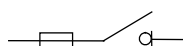
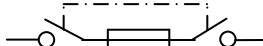
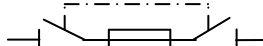
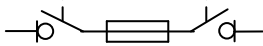
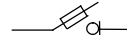
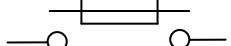
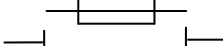
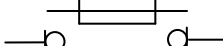
semi-independent manual operation

operation solely by means of directly applied manual energy such that the manual force is increased up to a threshold value beyond which the independent switching operation is achieved unless deliberately delayed by the operator

2.4 Summary of the equipment types

A summary of equipment definitions and relevant diagrams is given in Table 1.

Table 1 – Summary of equipment definitions

Functions		
Making and breaking current	Isolating	Making, breaking and isolating
Switch 	Disconnecter 	Switch-disconnector 
Fuse-combination units		
Switch-fuse single opening ^a 	Disconnecter-fuse single opening ^a 	Switch-disconnector-fuse single opening ^a 
Switch-fuse double opening ^b 	Disconnecter-fuse double opening ^b 	Switch-disconnector-fuse double opening ^b 
Fuse-switch single opening ^a 	Fuse-disconnector single opening ^a 	Fuse-switch-disconnector single opening ^a 
Fuse-switch double opening ^b 	Fuse-disconnector double opening ^b 	Fuse-switch-disconnector double opening ^b 
NOTE Equipment shown as single opening may comprise multiple openings in series.		
^a The fuse may be on either side of the contacts of the equipment. ^b Depending on the design, breaking may take place on one or both sides of the fuse-link.		

A2

3 Classification

3.1 According to the utilization category

See 4.4.

3.2 According to the method of operation of manually operated equipment

- dependent manual operation (A_1) see 2.4.12 of IEC 60947-1 A_1);
- independent manual operation (A_1) see 2.4.15 of IEC 60947-1 A_1);
- semi-independent manual operation (A_1) see 2.3.10 A_1).

NOTE The method of operation on closing may be different from the method for opening.

3.3 According to suitability for isolation

- suitable for isolation (see 7.1.7 of IEC 60947-1 and 7.1.7.1);
- not suitable for isolation.

3.4 According to the degree of protection provided

See 7.1.12 of IEC 60947-1.

4 Characteristics

4.1 Summary of characteristics

The characteristics of the equipment shall be stated in terms of the following as applicable:

- type of equipment (see 4.2);
- rated and limiting values for the main circuit (see 4.3);
- utilization category (see 4.4);
- control circuits (see 4.5);
- auxiliary circuits (see 4.6);

4.2 Type of equipment

A_2 The following information shall be stated:

- number of poles;
- kind of current (a.c. or d.c.);
- in the case of a.c., number of phases and rated frequency;
- number of positions of the main contacts (if more than two);
- breaking arrangement for fused devices (single opening or double opening). A_2

4.3 Rated and limiting values for the main circuit

Rated values are assigned by the manufacturer. They shall be stated in accordance with 4.3.1 to 4.3.6.4 but it may not be necessary to establish all the rated values listed.

4.3.1 Rated voltages

An equipment is defined by the following rated voltages.

4.3.1.1 Rated operational voltage (U_e)

Subclause 4.3.1.1 of IEC 60947-1 applies.

4.3.1.2 Rated insulation voltage (U_i)

Subclause 4.3.1.2 of IEC 60947-1 applies.

4.3.1.3 Rated impulse withstand voltage (U_{imp})

Subclause 4.3.1.3 of IEC 60947-1 applies.

4.3.2 Currents

An equipment is defined by the following currents.

4.3.2.1 Conventional free air thermal current (I_{th})

Subclause 4.3.2.1 of IEC 60947-1 applies.

4.3.2.2 Conventional enclosed thermal current (I_{the})

Subclause 4.3.2.2 of IEC 60947-1 applies.

4.3.2.3 Rated operational currents (I_e) (or rated operational powers)

Subclause 4.3.2.3 of IEC 60947-1 applies.

4.3.2.4 Rated uninterrupted current (I_u)

Subclause 4.3.2.4 of IEC 60947-1 applies.

4.3.3 Rated frequency

Subclause 4.3.3 of IEC 60947-1 applies.

4.3.4 Rated duty

The rated duties considered as normal are as follows.

4.3.4.1 Eight-hour duty

Subclause 4.3.4.1 of IEC 60947-1 applies.

4.3.4.2 Uninterrupted duty

Subclause 4.3.4.2 of IEC 60947-1 applies.

4.3.5 Normal load and overload characteristics

4.3.5.1 Ability to withstand motor switching overload currents

See Annex A.

4.3.5.2 Rated making capacity

Subclause 4.3.5.2 of IEC 60947-1 applies with the following additions.

The rated making capacity is stated by reference to the rated operational voltage and rated operational current and to the utilization category according to Table 3.

Not applicable to AC-20 or DC-20 equipment.

4.3.5.3 Rated breaking capacity

Subclause 4.3.5.3 of IEC 60947-1 applies with the following additions.

The rated breaking capacity is stated by reference to the rated operational voltage and rated operational current and to the utilization category according to Table 3.

Not applicable to AC-20 or DC-20 equipment.

4.3.6 Short-circuit characteristics

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

The rated short-time withstand current of a switch, a disconnecter or a switch-disconnector is the value of short-time withstand current, assigned by the manufacturer, that the equipment can carry without any damage under the test conditions of 8.3.5.1.

The value of the rated short-time withstand current shall be not less than twelve times the maximum rated operational current and, unless otherwise stated by the manufacturer, the duration of the current shall be 1 s.

For a.c., the value of the current is the r.m.s. value of the a.c. component and it is assumed that the highest peak value likely to occur does not exceed n times this r.m.s. value, the factor n being given by Table 16 of IEC 60947-1.

4.3.6.2 Rated short-circuit making capacity (I_{cm})

A1 Subclause 4.3.6.2 of IEC 60947-1 applies with the following addition.

NOTE I_{cm} is not applicable to fused devices. **A1**

4.3.6.3 Vacant

4.3.6.4 Rated conditional short-circuit current

Subclause 4.3.6.4 of IEC 60947-1 applies.

4.4 Utilization category

The utilization categories define the intended applications and are given in Table 2.

Each utilization category is characterized by the values of the currents and voltages, expressed as multiples of the rated operational current and the rated operational voltage, as well as the power-factors or time-constants of the circuit. The conditions for making and breaking given in Table 3 correspond in principle to the applications listed in Table 2.

The designation of utilization categories is completed by the suffix A or B according to whether the intended applications require frequent or infrequent operations (see Table 4).

Utilization categories with suffix B are appropriate for devices which, due to design or application, are only intended for infrequent operation. This could apply, for example, to disconnectors normally only operated to provide isolation for maintenance work or switching devices where the fuse-link blade forms the moving contact.

The distinction between frequent and infrequent operation is based on the manufacturer's rated operation and the number of operating cycles used as a test criterion in Table 4.

For a particular rated operational current I_e , a device will be designated for frequent use (category A) if the manufacturer's rated operating life is more than the number of operating cycles indicated in columns 3, 4 or 5 of Table 4.

Table 2 ± Utilization categories

Nature of current	Utilization categories		Typical applications
	Category A	Category B	
Alternating current	AC-20A ^a	AC-20B ^a	– Connecting and disconnecting under no-load conditions
	AC-21A	AC-21B	– Switching of resistive loads including moderate overloads
	AC-22A	AC-22B	– Switching of mixed resistive and inductive loads, including moderate overloads
	AC-23A	AC-23B	– Switching of motor loads or other highly inductive loads
Direct current	DC-20A ^a	DC-20B ^a	– Connecting and disconnecting under no-load conditions
	DC-21A	DC-21B	– Switching of resistive loads including moderate overloads
	DC-22A	DC-22B	– Switching of mixed resistive and inductive loads, including moderate overloads (e.g. shunt motors)
	DC-23A	DC-23B	– Switching of highly inductive loads (e.g. series motors)
^a The use of these utilization categories is not permitted in the USA.			

Category AC-23 includes occasional switching of individual motors. The switching of capacitors or of tungsten filament lamps shall be subject to agreement between manufacturer and user.

The utilization categories referred to in Tables 2 and 3 do not apply to an equipment normally used to start, accelerate and/or stop individual motors. The utilization categories for such an equipment are dealt with in Annex A.

4.5 Control circuits

Subclause 4.5 of IEC 60947-1 applies.

4.6 Auxiliary circuits

Subclause 4.6 of IEC 60947-1 applies.

4.7 Relays and releases

Subclause 4.7 of IEC 60947-1 applies.

A1 4.8 Co-ordination with short circuit protective devices (SCPD)

Subclause 4.8 of IEC 60947-1 applies. **A1**

5 Product information

5.1 Nature of information

Subclause 5.1 of IEC 60947-1 applies as appropriate for a particular design.

5.2 Marking

5.2.1 Each equipment shall be marked in a durable and legible manner with the following data.

The markings for a), b) and c) below shall be on the equipment itself or on a name-plate or name-plates attached to the equipment, and shall be located at a place such that they are legible from the front after mounting the equipment in accordance with the manufacturer's instructions.

- a) Indication of the open and closed position. The open and closed position shall be respectively indicated by the graphical symbols 60417-IEC-5007 and 60417-IEC-5008 of IEC 60417-2 (see 7.1.6.1 of IEC 60947-1).
- b) Suitability for isolation.
The appropriate symbols of Table 1 shall be used.
- c) Additional marking for disconnectors.

Devices of utilization category AC-20A, AC-20B, DC-20A and DC-20B shall be marked "Do not operate under load", unless the device is interlocked to prevent such operation.

NOTE Symbols of the various types of equipment are given in Table 1.

5.2.2 The following data shall also be marked on the equipment but need not be visible from the front when the equipment is mounted:

- a) manufacturer's name or trade mark;
- b) type designation or serial number;
-  c) rated operational currents (or rated powers) with the corresponding rated operational voltage and utilization category (see 4.3.1, 4.3.2 and 4.4); 
- d) value (or range) of the rated frequency or the indication "d.c." (or the symbol $\equiv$);
-  e) for fuse-combination units, the fuse characteristics and maximum rated current and the maximum power loss of the fuse-link; 
- f) IEC 60947-3, if the manufacturer claims compliance with this part;
- g) degree of protection of enclosed equipment (see Annex C of IEC 60947-1).

5.2.3 The following terminals shall be identified:

- a) line and load terminals unless the connection is immaterial (see 8.3.3.3.1);
- b) neutral pole terminal, if applicable, by the letter "N" (see 7.1.8.4 of IEC 60947-1);
- c) protective earth terminal (see 7.1.10.3 of IEC 60947-1).

5.2.4 The following data shall be made available in the manufacturer's published information:

- a) rated insulation voltage;
- b) rated impulse withstand voltage for equipment suitable for isolation or when determined;
- c) pollution degree, if different from 3;
- d) rated duty;
- e) rated short-time withstand current and duration, where applicable;
- f) rated short-circuit making capacity, where applicable;
- g) rated conditional short-circuit current, where applicable.

5.3 Instructions for installation, operation and maintenance

Subclause 5.3 of IEC 60947-1 applies.

6 Normal service, mounting and transport conditions

Clause 6 of IEC 60947-1 applies with the following addition.

Pollution degree (see 6.1.3.2 of IEC 60947-1).

Unless otherwise stated by the manufacturer, the equipment is intended for installation under environmental conditions of pollution degree 3.

7 Constructional and performance requirements

7.1 Constructional requirements

Subclause 7.1 of IEC 60947-1 applies, with the following additions.

 Text deleted 

7.1.2.2 Glow wire testing

Subclause 7.1.2.2 of IEC 60947-1 applies with the following additions.

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

 Text deleted 

7.1.7 Additional requirements for equipment suitable for isolation

Subclause 7.1.7 of IEC 60947-1 applies with the following additions.

7.1.7.1 Additional constructional requirements

The equipment shall be marked according to 5.2.1 b).

When no indication of the position of the contacts is provided, for example by the actuator or a separate indicator, all the main contacts shall be clearly visible in the open position.

The strength of the actuating mechanism and the reliability of the indication of the open position shall be checked according to 8.2.5. Moreover, when means are provided by the manufacturer to lock the equipment in the open position, locking shall only be possible when the main contacts are in the open position (see 8.2.5).

This requirement does not apply to equipment where the main contact position is visible in the open position and/or the open position is indicated by other means than the actuator.

NOTE Locking in the closed position is permitted for particular applications.

The clearance across the open contacts of the same pole when in the open position shall not be less than the minimum clearance given in Table 13 of IEC 60947-1 and shall also comply with the requirements of 7.2.3.1 b) of IEC 60947-1.