

INTERNATIONAL STANDARD

NORME INTERNATIONALE

AMENDMENT 2
AMENDEMENT 2

**Low-voltage switchgear and controlgear –
Part 4-3: Contactors and motor-starters – AC semiconductor controllers and
contactors for non-motor loads**

**Appareillage à basse tension –
Partie 4-3: Contacteurs et démarreurs de moteurs – Gradateurs et contacteurs à
semiconducteurs pour charges, autres que des moteurs, à courant alternatif**



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FOREWORD

This amendment has been prepared by subcommittee 17B: Low-voltage switchgear and controlgear, of IEC technical committee 17: Switchgear and controlgear.

The text of this amendment is based on the following documents:

FDIS	Report on voting
17B/1727/FDIS	17B/1735/RVD

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

The committee has decided that the contents of this amendment and the base publication will remain unchanged until the stability date indicated on the IEC web site under "http://webstore.iec.ch" in the data related to the specific publication. At this date, the publication will be

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- withdrawn,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

Changes to be made to IEC 60947-4-3:1999:

5.3.1.1 Rated operational voltage (U_e)

Replace, in IEC 60947-4-3:1999, the existing text of this subclause by the following:

Subclause 4.3.1.1 of IEC 60947-1 applies with the following addition.

The rating of a.c. equipment shall include the number of phases except that the rating of equipment obviously intended for single-phase use only is not required to include the number of phases.

6.1 Nature of information

Replace, in IEC 60947-4-3:1999, the existing text of item f) by the following:

- f) either the value of the rated frequency 50 Hz/60 Hz,
or other rated frequencies for example 16 2/3 Hz, 400 Hz;

6.2 Marking

Modify, in IEC 60947-4-3:1999, the existing text of the second and third paragraphs as follows:

Data under d) to u) in 6.1 shall be included on the nameplate, or on the equipment, or in the manufacturer's published literature.

Data under c) and l) in 6.1 shall preferably be marked on the equipment.

8.2.2.8 Other parts

Replace, in IEC 60947-4-3:1999, the existing text by the following:

Subclause 7.2.2.8 of IEC 60947-1 applies, replacing words “plastics and insulating materials” with “insulating parts”.

8.3.2.1.1 Harmonics

Replace, in IEC 60947-4-3:1999, the existing text of this subclause by the following:

Subclause 7.3.3.2.2 of IEC 60947-1 applies with the following addition:

Because no significant harmonic emission are produced in the FULL-ON state, tests are not required on those controllers or contactors which run only in the FULL-ON state or which are by-passed by a mechanical switching device after completing a start.

9.1.5 Special tests

Replace, in IEC 60947-4-3:1999, the existing text of this subclause by the following:

Special tests comprise damp heat, salt mist, vibration and shock tests. For these tests, Annex Q of IEC 60947-1 applies. The conditions of application are under consideration.

9.3.2 General test conditions

Replace, in IEC 60947-4-3:1999, the existing text of this subclause by the following:

Subclause 8.3.2 of IEC 60947-1 applies with the following addition.

Except for devices specifically rated for only one frequency, tests performed at 50 Hz cover 60 Hz applications and vice-versa.

The selection of samples to be tested for a series of devices with the same fundamental design and without a significant difference in construction shall be based on engineering judgement.

Unless otherwise specified in the relevant test clause, the clamping torque for connections shall be that specified by the manufacturer or, if not specified, the torque given in Table 4 of IEC 60947-1.

In the case where several heat sinks are specified, the one which has the higher thermal resistance shall be used.

True r.m.s. voltage and current measuring means shall be used.

9.3.3.4.1 Type tests

- 5) Power-frequency withstand verification after humidity treatment

Replace, in IEC 60947-4-3:1999, the existing title and text of this paragraph as follows:

- 5) Vacant

9.3.4.1.1 General requirements for short-circuit tests

Replace, in IEC 60947-4-3:1999, the existing text of this subclause by the following:

The general requirements of 8.3.4.1.1 of IEC 60947-1 apply with the following modification.

The enclosure shall be in accordance with the manufacturer's specifications. In the case where multiple enclosure options are provided, the enclosure with the smallest volume shall be taken.

If devices tested in free air may also be used in enclosures, they shall be additionally tested in the smallest of such enclosures stated by the manufacturer. For devices tested only in free air, information shall be provided to indicate that they are not suitable for use in an individual enclosure.

9.3.4.1.1 Test at the rated conditional short-circuit current at I_q

Replace, in the second paragraph of IEC 60947-4-3:1999, "figure 3 of IEC 60269-1" by "figure 4 of IEC 60269-1".

9.3.5.2.5 Harmonics and commutation notches

Replace, in IEC 60947-4-3:1999, the existing text of this subclause by the following:

No requirements, the test levels are under study for the future.

9.3.6.2 Operation and operating limits

Replace, in IEC 60947-4-3:1999, the existing text of the third paragraph of this subclause by the following:

The 2 following tests shall be made.

- a) Functionality shall be verified by a blocking and commutating capability test according to Table 7.

Two operating cycles are required, one at 85 % U_e with 85 % U_s , and one at 110 % U_e with 110 % U_s . No loss of functionality as specified by the manufacturer is permitted.

- b) It shall be verified that the equipment operates according to the requirements of 8.2.1.5.

Changes to be made to Amendment 1:2006:

2 Normative references

Delete, in Amendment 1:2006, the footnotes of this clause.

Replace, in Amendment 1:2006, the reference to IEC 60085:2004 by the following:

IEC 60085:2007, *Electrical insulation – Thermal evaluation and designation*

Replace, in Amendment 1:2006, the reference to IEC 60947-1:2004 by the following:

IEC 60947-1:2007, *Low-voltage switchgear and controlgear – Part 1: General rules*

Replace in Amendment 1:2006, the references to IEC 61000-3-2:2000 and its Amendments 1 and 2 by the following:

IEC 61000-3-2:2005, *Electromagnetic compatibility (EMC) – Part 3-2: Limits – Limits for harmonic current emissions (equipment input current ≤ 16 A per phase)*

Amendment 1 (2008)

Amendment 2 (2009)

<https://standards.iec.ch/sata/standards/ast/196/50be-12cf-4b89-bc9c-1c9b349c4643/iec-60947-4-3-1999-amd2-2011>

Replace, in Amendment 1:2006, the reference to IEC 61000-4-3:2002 and its Amendment 1 by the following:

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

Amendment 1 (2007)

Amendment 2 (2010)

Replace, in Amendment 1:2006, the references to IEC 61000-4-6:2003 and its Amendments 1 and 2 by the following:

IEC 61000-4-6:2008, *Electromagnetic compatibility (EMC) – Part 4-6: Testing and measurement techniques – Immunity to conducted disturbances, induced by radio-frequency fields*

Delete in Amendment 1:2006, the reference to IEC 61131-2:2002.

Replace, in Amendment 1:2006, the references to CISPR 11:2003 and its Amendment 1, by the following:

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

Amendment 1 (2010)

5.6 Auxiliary circuits

Replace, in Amendment 1:2006, the existing paragraph by the following new text:

Digital inputs and/or digital outputs contained in controllers and contactors, and intended to be compatible with PLCs, shall fulfil the requirements of Annex S of IEC 60947-1.

8.2.2 Temperature rise

Replace, in Amendment 1:2006, the existing text of the first paragraph by the following:

The requirements of 7.2.2 of IEC 60947-1 apply to controllers and contactors in a clean, new condition.

NOTE Contact resistance due to oxidation may impact the temperature rise test at test voltages below 100 V. In the case of conducting the test at a voltage below 100 V, mechanical switching devices may have the contacts cleaned either by any non-abrasive method or by carrying out operating cycles with or without load several times prior to initiating the test at any voltage.

Changes to be made to both IEC 60947-4-3:1999 and Amendment 1:2006:

2 Normative references

Delete in Amendment 1:2006 the reference to Amendment 1 of IEC 60269-1 and replace, in IEC 60947-4-3:1999, the reference to IEC 60269-1:1998 by the following:

IEC 60269-1:2006, *Low-voltage fuses – Part 1: General requirements*

Delete in Amendment 1:2006 the references to Amendments 1 and 2 of IEC 61000-4-2 and replace, in IEC 60947-4-3:1999 the reference to IEC 61000-4-2:1995 by the following:

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

Delete in Amendment 1:2006 the references to Amendments 1 and 2 of IEC 61000-4-4 and replace, in IEC 60947-4-3:1999, the reference to IEC 61000-4-4:1995 by the following:

IEC 61000-4-4:2004, *Electromagnetic compatibility (EMC) – Part 4-4: Testing and measurement techniques – Electrical fast transient/burst immunity test*
Amendment 1 (2010)

Delete in Amendment 1:2006 the reference to Amendment 1 of IEC 61000-4-5 and replace, in IEC 60947-4-3:1999, the reference to IEC 61000-4-5:1995 by the following:

IEC 61000-4-5:2005, *Electromagnetic compatibility (EMC) – Part 4-5: Testing and measurement techniques – Surge immunity test*

Delete in Amendment 1:2006 the reference to Amendment 1 of IEC 61000-4-11 and replace, in IEC 60947-4-3:1999, the reference to IEC 61000-4-11:1994 by the following:

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

8.1 Constructional requirements

Replace, in IEC 60947-4-3:1999, the whole Subclause 8.1, including 8.1.3 of Amendment 1:2006, by the following:

8.1.1 General

Subclause 7.1.1 of IEC 60947-1 applies.

8.1.2 Materials

8.1.2.1 General materials requirements

Subclause 7.1.2.1 of IEC 60947-1 applies.

8.1.2.2 Glow wire testing

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

When tests on the equipment or on sections taken from the equipment are used, parts of insulating materials necessary to retain current-carrying parts in position shall conform to the glow-wire tests in 8.2.1.1.1 of IEC 60947-1 at a test temperature of 850 °C.

8.1.2.3 Test based on flammability category

Subclause 7.1.2.3 of IEC 60947-1 applies.

8.1.3 Current-carrying parts and their connections

Subclause 7.1.3 of IEC 60947-1 applies.

8.1.4 Clearances and creepage distances

Subclause 7.1.4 of IEC 60947-1 applies with the following note.

NOTE The nature of a semiconductor makes it unsuitable for use for isolation purposes.

8.1.5 Actuator

Vacant

8.1.6 Indication of the contact position

Vacant

8.1.7 Additional requirements for equipment suitable for isolation

Vacant

8.1.8 Terminals

Subclause 7.1.8 of IEC 60947-1 applies with, however, the following additional requirements.

8.1.8.4 Terminal identification and marking

Subclause 7.1.8.4 of IEC 60947-1 applies with additional requirements as given in Annex A.

8.1.9 Additional requirements for equipment provided with a neutral pole

Vacant

8.1.10 Provisions for protective earthing

Subclause 7.1.10 of IEC 60947-1 applies.

8.1.11 Enclosures for equipment

Subclause 7.1.11 of IEC 60947-1 applies.

8.1.12 Degrees of protection of enclosed equipment

Subclause 7.1.12 of IEC 60947-1 applies.

8.1.13 Conduit pull-out, torque and bending with metallic conduits

Subclause 7.1.13 of IEC 60947-1 applies.

9.3.3.3.4 Temperature rise of the main circuit

Replace the first paragraph of IEC 60947-4-3:1999, the second paragraph added by Amendment 1:2006 and the third paragraph of IEC 60947-4-3:1999 by the following:

Subclause 8.3.3.3.4 of IEC 60947-1 applies with the exception that a single phase test shall be conducted with all poles in the main circuit loaded at their individual maximum rated currents and as stated in 8.2.2.4, and with the following additions:

For semiconductor switching devices connected in the main circuit (see 8.2.2.4), temperature sensing means shall be attached to the outer surface of the case of the semiconductor switching device that is most likely to produce the highest temperature rise during this test. The final case temperature, C_f , and the final ambient temperature, A_f , shall be recorded for use in the test of 9.3.3.6.2.

For mechanical switching devices (see 8.2.2.4.2 and 8.2.2.4.4), temperature sensing means shall be attached in accordance with the requirements of 8.3.3.3 of IEC 60947-1.

Withdrawing

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IEC 60947-4-3:1999/AMD2:2011

<https://standards.iteh.ai/catalog/standards/sist/196750be-12cf-4b89-bc9c-1c9f349c4643/iec-60947-4-3-1999-amd2-2011>