
**High-voltage alternating current contactors and contactor-based motor starters
(IEC 60470:1999)**

High-voltage alternating current contactors and contactor-based motor starters

Hochspannungs-Wechselstrom-Schütze und -Motorstarter mit Schützen

Contacteurs pour courants alternatifs haute tension et démarreurs de moteurs à
contacteurs

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Ta slovenski standard je istoveten z: EN 60470:2000

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EUROPEAN STANDARD

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(CEI 60470:1999)

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This European Standard was approved by CENELEC on 2000-04-01. 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, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

CENELEC

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

Central Secretariat: rue de Stassart 35, B - 1050 Brussels

Foreword

The text of document 17A/554/FDIS, future edition 2 of IEC 60470, prepared by SC 17A, High-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 60470 on 2000-04-01.

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) 2001-01-01
- latest date by which the national standards conflicting
with the EN have to be withdrawn (dow) 2003-04-01

Annexes designated "normative" are part of the body of the standard.
In this standard, annexes A and ZA are normative.
Annex ZA has been added by CENELEC.

This standard is to be read in conjunction with EN 60694:1996, which is applicable unless otherwise specified in this standard. In order to simplify the indication of corresponding requirements, the same numbering of clauses and subclauses as in EN 60694 is used. Amendments to these clauses and subclauses are given under the same references whilst additional subclauses are numbered from 101.

iTeh STANDARD PREVIEW Endorsement notice (standards.iteh.ai)

The text of the International Standard IEC 60470:1999 was approved by CENELEC as a European Standard without any modification.

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Annex ZA (normative)**Normative references to international publications
with their corresponding European publications**

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

NOTE When an international publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 60034-11	1978	Rotating electrical machines Part 11: Built-in thermal protection -- Chapter 1: Rules for protection of rotating electrical machines	-	-
IEC 60050-441	1984	International Electrotechnical Vocabulary (IEV) Chapter 441: Switchgear, controlgear and fuses	-	-
IEC 60056 (mod)	1987	High-voltage alternating-current circuit-breakers	HD 348 S7 ¹⁾	1998
IEC 60076-2 (mod)	1993	Power transformers Part 2: Temperature rise	EN 60076-2	1997
IEC 60129	1984	Alternating current disconnectors and earthing switches	EN 60129	1994
IEC 60255-8 (mod)	1990	Electrical relays Part 8: Thermal electrical relays	EN 60255-8	1998
IEC 60265-1	1983	High-voltage switches Part 1: High-voltage switches for rated voltages above 1 kV and less than 52 kV	HD 355.1 S3 ²⁾	1995
IEC 60282-1	1994	High-voltage fuses Part 1: Current-limiting fuses	EN 60282-1 + corr. December	1996 1997
IEC 60298	1990	A.C. metal-enclosed switchgear and controlgear for rated voltages above 1 kV and up to and including 52 kV	EN 60298 ³⁾ + A11	1996 1999

1) HD 348 S7 includes A3:1996 to IEC 60056.

2) HD 355.1 S3 is superseded by EN 60265-1:1998, which is based on IEC 60265-1:1998.

3) EN 60298 includes corrigendum April 1995 + A1:1994.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 60417	Series	Graphical symbols for use on equipment	EN 60417	Series
IEC 60644	1979	Specification for high-voltage fuse-links for motor circuit applications	EN 60644	1993
IEC 60694	1996	Common specifications for high-voltage switchgear and controlgear standards	EN 60694 + corr. May	1996 1999
IEC 60726 (mod)	1982	Dry-type power transformers	HD 464 S1 ⁴⁾	1988
IEC 60947-5-1	1997	Low-voltage switchgear and controlgear Part 5-1: Control circuit devices and switching elements - Electromechanical control circuit devices	EN 60947-5-1 + A12	1997 1999
IEC 61233	1994	High-voltage alternating current circuit-breakers - Inductive load switching	-	-
IEC 61812-1	1996	Specified time relays for industrial use Part 1: Requirements and tests	EN 61812-1 + A11 + corr. February	1996 1999 1999

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4) HD 464 S1 includes A1:1986 to IEC 60726.

INTERNATIONAL STANDARD

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60470

Second edition
1999-10

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CONTENTS

	Page
FOREWORD	5
Clause	
1 General.....	7
1.1 Scope and object	7
1.2 Normative references	9
2 Normal service conditions	10
2.1 Special service conditions	10
3 Definitions.....	10
3.1 General terms	10
3.2 Assemblies of switchgear and controlgear	11
3.3 Parts of assemblies.....	11
3.4 Switching devices.....	11
3.5 Parts of switchgear and controlgear.....	13
3.6 Operation.....	14
3.7 Characteristic quantities.....	16
4 Ratings	20
4.1 Rated voltage (U_r)	22
4.2 Rated insulation level	22
4.3 Rated frequency (f_r)	23
4.4 Rated normal current and temperature rise.....	23
4.5 Rated short-time withstand current (I_k)	24
4.6 Rated peak withstand current (I_p)	24
4.7 Rated duration of short circuit (t_k).....	24
4.8 Rated supply voltage of closing and opening devices, and of auxiliary and control circuits (U_a)	24
4.9 Rated supply frequency of closing and opening devices, and of auxiliary circuits....	24
4.10 Rated pressure of compressed gas supply for insulation and/or operation.....	24
5 Design and construction	33
5.1 Requirements for liquids.....	33
5.2 Requirements for gases	33
5.3 Earthing	33
5.4 Auxiliary and control equipment.....	34
5.5 Dependent power operation.....	34
5.6 Stored energy operation	34
5.7 Independent manual operation	34
5.8 Operation of releases.....	34
5.9 Low- and high-pressure interlocking and monitoring devices	34
5.10 Nameplates.....	34
5.11 Interlocking devices	35
5.12 Position indication	35
5.13 Degrees of protection by enclosures.....	35
5.14 Creepage distances	35

Clause	Page
5.15 Gas and vacuum tightness	35
5.16 Liquid tightness	36
5.17 Flammability	36
5.18 Electromagnetic compatibility (EMC)	36
6 Type tests	41
6.1 General	41
6.2 Dielectric tests	43
6.3 Radio interference voltage (r.i.v.) test	43
6.4 Measurement of the resistance of circuits	43
6.5 Temperature-rise tests	43
6.6 Short-time withstand current and peak withstand current tests	47
6.7 Verification of the protection	47
6.8 Tightness tests	47
6.9 Electromagnetic compatibility tests (EMC)	47
7 Routine tests	59
7.1 Dielectric test on the main circuit	59
7.2 Dielectric test on auxiliary and control circuits	59
7.3 Measurement of the resistance of the main circuit	59
7.4 Tightness test	59
7.5 Design and visual checks	60
8 Guide to the selection of contactors and motor-starters for service	61
9 Information to be given with enquiries, tenders and orders	65
10 Rules for transport, storage, erection, operation and maintenance	66
11 Safety	66
Annex A (normative) Records and reports of type tests for making, breaking and short-time current performance	75
Figure 1 – Examples of speed/time curves	67
Figure 2 – Test duties A and B – preferred earth point	68
Figure 3 – Test duties A and B – alternative earth point	69
Figure 4 – Test duty C – preferred earth point	70
Figure 5 – Test duty C – alternative earth point	71
Figure 6 – Representation by two parameters of a prospective TRV of a circuit	71
Figure 7 – Representation by four parameters of a prospective TRV of a circuit	72
Figure 8 – Representation of the specified TRV by a two-parameter reference line and a delay line	72
Figure 9 – Determination of power frequency recovery voltage	73
Figure 10 – Characteristics for determining take-over current	74

	Page
Table 1 – Ratings and characteristics – Rating/characteristic	21
Table 2 – Utilization categories	28
Table 3 – Characteristics dependent on starter type	33
Table 4 – Characteristics of the opening operation of overload relays when energized on all poles	39
Table 5 – Characteristics of the opening operation of three-pole thermal overload relays when energized on two poles only	39
Table 6 – Characteristics of the opening by three-pole phase failure-sensitive thermal overload relays when their poles are not equally energized	40
Table 7 – Applicable type tests	42
Table 8 – Test copper conductors for test currents up to 800 A inclusive	44
Table 9 – Intermittent duty operating cycles	45
Table 10 – Verification of rated making and breaking capacities – Conditions for making and breaking corresponding to the several utilization categories at rated voltage U_r	49
Table 11 – Relationship between current broken I_c and OFF time	52
Table 12 – Overload current withstand requirements	53
Table 13 – Transient recovery voltage characteristics	58
Table 14 – Verification of the number of on-load operating cycles – Conditions for making and breaking corresponding to the several utilization categories	59

INTERNATIONAL ELECTROTECHNICAL COMMISSION

**HIGH-VOLTAGE ALTERNATING CURRENT CONTACTORS
AND CONTACTOR-BASED MOTOR-STARTERS**

FOREWORD

- 1) The IEC (International Electrotechnical Commission) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of the IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, the IEC publishes International Standards. Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. The IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
- 2) The formal decisions or agreements of the IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested National Committees.
- 3) The documents produced have the form of recommendations for international use and are published in the form of standards, technical reports or guides and they are accepted by the National Committees in that sense.
- 4) In order to promote international unification, IEC National Committees undertake to apply IEC International Standards transparently to the maximum extent possible in their national and regional standards. Any divergence between the IEC Standard and the corresponding national or regional standard shall be clearly indicated in the latter.
- 5) The IEC provides no marking procedure to indicate its approval and cannot be rendered responsible for any equipment declared to be in conformity with one of its standards.
- 6) Attention is drawn to the possibility that some of the elements of this International Standard may be the subject of patent rights. The IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 60470 has been prepared by subcommittee 17A: High-voltage switchgear and controlgear, of IEC technical committee 17: Switchgear and controlgear.

This standard is to be read in conjunction with IEC 60694, second edition, published in 1996, which is applicable unless otherwise specified in this standard. In order to simplify the indication of corresponding requirements, the same numbering of clauses and subclauses as in IEC 60694 is used. Amendments to these clauses and subclauses are given under the same references whilst additional subclauses are numbered from 101.

This second edition cancels and replaces the first edition of IEC 60470 published in 1974 and its amendment 1 (1995), as well as IEC 60632-1.

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

FDIS	Report on voting
17A/545/FDIS	17A/554/RVD

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

This publication has been drafted in accordance with the ISO/IEC Directives, Part 3.

Annex A forms an integral part of this standard.

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

The committee has decided that this publication remains valid until 2011. At this date, in accordance with the committee's decision, the publication will be

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

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HIGH-VOLTAGE ALTERNATING CURRENT CONTACTORS AND CONTACTOR-BASED MOTOR-STARTERS

1 General

1.1 Scope and object

This International Standard is applicable to a.c. contactors and/or contactor-based motor-starters designed for indoor installation and operation at frequencies up to and including 60 Hz on systems having voltages above 1 000 V but not exceeding 12 000 V.

It is applicable only to three-pole contactors and starters for use in three-phase systems, and single-pole contactors and starters for use in single-phase systems. Two-pole contactors and starters for use in single-phase systems are subject to agreement between manufacturer and user.

Contactors and/or starters dealt with in this standard are not normally designed to interrupt short-circuit currents. Therefore, suitable short-circuit protection (see 3.4.110.12 and note 2 below) forms part of the installation, but not necessarily of the contactor or the starter.

In this context, this standard gives requirements for

- contactors associated with overload and/or short-circuit protective devices (SCPD);
- starters associated with separate short-circuit protective devices and/or with separate short-circuit and integrated overload protective devices;
- contactors or starters combined, under specified conditions, with their own short-circuit protective devices. Such combinations, for example combination starters (see 3.4.110.9), are rated as units.

Contactors intended for closing and opening electric circuits and, if combined with suitable relays, for protecting these circuits against operating overloads which may occur therein, are covered in this standard.

This standard is also applicable to the operating devices of contactors and to their auxiliary equipment.

Motor-starters intended to start and accelerate motors to normal speed, to ensure continuous operation of motors, to switch off the supply from the motor and to provide means for the protection of motors and associated circuits against operating overloads are dealt with.

Motor-starter types included are

- direct-on-line starters;
- reversing starters;
- two-direction starters;
- reduced kVA (voltage) starters;

- auto-transformer starters;
- rheostatic starters;
- reactor starters.

Starters, the operation of which depends on thermal electrical relays for motor protection complying with IEC 60255-8, or motor-incorporated thermal protective devices dealt with in IEC 60034-11, do not necessarily meet all the relevant requirements of this standard.

Overload relays for starters, including those based on solid-state technology, are covered by this standard.

This standard does not apply to

- circuit-breaker-based motor-starters;
- single-pole operation of multi-pole contactors or starters;
- two-step auto-transformer starters designed for continuous operation in the starting position;
- unbalanced rheostatic rotor starters, i.e. where the resistances do not have the same value in all phases;
- equipment designed not only for starting, but also for adjustment of speed;
- liquid starters and those of the "liquid-vapour" type;
- semiconductor contactors and starters making use of semiconductor contactors in the main circuit;
- rheostatic stator starters;
- contactors or starters designed for special applications.

This standard does not deal with components contained in contactors and contactor-based motor-starters, for which individual specifications exist.

NOTE 1 Thermal electrical relays are covered by IEC 60255-8.

NOTE 2 High-voltage current-limiting fuses are covered by IEC 60282-1 and IEC 60644.

NOTE 3 Metal-enclosed switchgear and controlgear for rated voltages above 1 kV and up to and including 52 kV are covered by IEC 60298.

NOTE 4 Disconnectors and earthing switches are covered by IEC 60129.

NOTE 5 High-voltage switches above 1 kV and less than 52 kV are covered by IEC 60265-1.

The object of this standard is to state

- a) the characteristics of contactors and starters and associated equipment;
- b) the conditions with which contactors or starters shall comply with reference to:
 - 1) their operation and behaviour,
 - 2) their dielectric properties,
 - 3) the degrees of protection provided by their enclosures, where applicable,
 - 4) their construction,
 - 5) for combinations, interactions between the various components, for example SCPD co-ordination;
- c) the tests intended for confirming that these conditions have been met, and the methods to be adopted for these tests;
- d) the information to be given with the equipment or in the manufacturer's literature.

1.2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this International Standard. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of IEC and ISO maintain registers of currently valid International Standards.

IEC 60034-11:1978, *Rotating electrical machines – Part 11: Built-in thermal protection – Chapter 1: Rules for protection of rotating electrical machines*

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

IEC 60056:1987, *High-voltage alternating-current circuit-breakers*

IEC 60076-2:1993, *Power transformers – Part 2: Temperature rise*

IEC 60129:1984, *Alternating current disconnectors and earthing switches*

IEC 60255-8:1990, *Electrical relays – Part 8: Thermal electrical relays*

IEC 60265-1:1983, *High-voltage switches – Part 1: High-voltage switches for rated voltages above 1 kV and less than 52 kV*

IEC 60282-1:1994, *High-voltage fuses – Part 1: Current-limiting fuses*

IEC 60298:1990, *A.C. metal-enclosed switchgear and controlgear for rated voltages above 1 kV and up to and including 52 kV*
Amendment 1 (1994)

IEC 60417, (all parts) *Graphical symbols for use on equipment – Index, survey and compilation of the single sheets*

IEC 60644:1979, *Specification for high-voltage fuse-links for motor circuit applications*

IEC 60694:1996, *Common specifications for high-voltage switchgear and controlgear standards*

IEC 60726:1982, *Dry-type power transformers*

IEC 60947-5-1:1997, *Low-voltage switchgear and controlgear – Part 5: Control circuit devices and switching elements – Section one: Electromechanical control circuit devices*

IEC 61233:1994, *High-voltage alternating current circuit-breakers – Inductive load switching*

IEC 61812-1:1996, *Specified time relays for industrial use – Part 1: Requirements and tests*