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I.S. EN 62271-106:2011

High-voltage switchgear and controlgear -- Part 106: Alternating current contactors, contactor-based controllers and motor-starters (IEC 62271-106:2011 (EQV))

I.S. EN 62271-106:2011

Incorporating amendments/corrigenda issued since publication:

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Supersedes EN 60470:2000 + corr. Jun.2000

English version

**High-voltage switchgear and controlgear -
Part 106: Alternating current contactors, contactor-based controllers and
motor-starters
(IEC 62271-106:2011)**

Appareillage à haute tension -
Partie 106: Contacteurs, combinés de
démarrage à contacteurs et démarreurs
de moteurs, pour courant alternatif
(CEI 62271-106:2011)

Hochspannungs-Schaltgeräte und -
Schaltanlagen -
Teil 106: Wechselstrom-Schütze,
Kombinationsstarter und Motorstarter mit
Schützen
(IEC 62271-106:2011)

This European Standard was approved by CENELEC on 2011-09-23. 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 CEN-CENELEC Management Centre 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 CEN-CENELEC Management Centre has the same status as the official versions.

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CENELEC

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

Management Centre: Avenue Marnix 17, B - 1000 Brussels

Foreword

The text of document 17A/971/FDIS, future edition 1 of IEC 62271-106, 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 approved by CENELEC as EN 62271-106:2011.

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) 2012-06-23
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2014-09-23

This document supersedes EN 60470:2000 + corrigendum June 2000.

EN 62271-106:2011 includes the following significant technical changes with respect to EN 60470:2000:

- Scope and object: The voltage range covered by the standard was expanded from 12 Kv to 24 kV. Overload relay calibration and testing is not covered by this standard.
- 3 Terms and definitions: Added definitions for capacitor switching classes.
- 4.1 Rated voltage: Added 15, 17,5 and 24 kV as standard voltage values.
- 4.109.2 Starting duty of reduced-voltage starters: Added ratings for autotransformer and reactor starters (was in the testing section).
- 4.112 Rated capacitive switching currents: Added capacitor switching current ratings.
- 5.101 Protective relays: Removed the requirements for overload relays. This section is obsolete since there are only a few MV starters fitted with thermal overload relays and electronic relays have their own standards.
- 6.2.5 Application of the test voltage and test conditions (former 6.2.2 b)): Changed wording of requirement for impulse across the open gap of vacuum contactors.
- 6.4.2 Auxiliary circuits: The requirement for resistance checks of auxiliary circuits was deleted.
- 6.5.5.104 Temperature rise of the auto-transformer or reactor for two-step auto-transformer or reactor starters: Reworded to transfer ratings to subclause 4.109.2.
- 6.102.9 Condition following making and breaking tests: Gave specific direction as to what the tolerance should be based on where the resistance was to be checked.
- 6.104 Short-circuit current making and breaking tests: Clarified test conditions for shortcircuit testing.
- 6.109 Capacitive current switching tests: Added capacitive current switching tests.
- Annex B: Added Table B.1 – Tolerances on test quantities for type test.

This standard is to be read in conjunction with EN 62271-1:2008, to which it refers and 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 is used as in EN 62271-1. Amendments to these clauses and subclauses are given under the same references whilst additional subclauses are numbered from 101.

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 62271-106:2011 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 standards indicated:

IEC 60034-11	NOTE	Harmonized as EN 60034-11.
IEC 60060 series	NOTE	Harmonized in EN 60060 series.
IEC 60060-1	NOTE	Harmonized as EN 60060-1.
IEC 60060-2	NOTE	Harmonized as EN 60060-2.
IEC 60076-11:2004	NOTE	Harmonized as EN 60076-11:2004 (not modified).
IEC 60076-2	NOTE	Harmonized as EN 60076-2.
IEC 60255-8	NOTE	Harmonized as EN 60255-8.
IEC 60947-5-1	NOTE	Harmonized as EN 60947-5-1.
IEC 61230	NOTE	Harmonized as EN 61230.
IEC 61812-1	NOTE	Harmonized as EN 61812-1.
IEC 62271-103	NOTE	Harmonized as EN 62271-103.
IEC 62271-110:2009	NOTE	Harmonized as EN 62271-110:2009 (not modified).

Annex ZA (normative)

Normative references to international publications with their corresponding European publications

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.

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 60282-1	-	High-voltage fuses - Part 1: Current-limiting fuses	EN 60282-1	-
IEC 60417	Data- base	Graphical symbols for use on equipment	-	-
IEC 60644	-	Specification for high voltage fuse-links for motor circuit application	EN 60644	-
IEC 62271-1	2007	High-voltage switchgear and controlgear - Part 1: Common specifications	EN 62271-1	2008
IEC 62271-100	2008	High-voltage switchgear and controlgear - Part 100: Alternating current circuit-breakers	EN 62271-100	2009
IEC 62271-102	-	High-voltage switchgear and controlgear - Part 102: Alternating current disconnectors and earthing switches	EN 62271-102	-
IEC 62271-200	2003	High-voltage switchgear and controlgear - Part 200: AC metal-enclosed switchgear and controlgear for rated voltages above 1 kV and up to and including 52 kV	EN 62271-200	2004

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

HIGH-VOLTAGE SWITCHGEAR AND CONTROLGEAR –

Part 106: Alternating current contactors, contactor-based controllers and motor-starters

FOREWORD

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of 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, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). 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. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
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International Standard IEC 62271-106 has been prepared by subcommittee 17A: High-voltage switchgear and controlgear, of IEC technical committee 17: Switchgear and controlgear.

This standard cancels and replaces the second edition of IEC 60470 published in 1999. It constitutes a technical revision.

This edition includes the following significant technical changes with respect to IEC 60470:1999:

- Scope and object: The voltage range covered by the standard was expanded from 12 kV to 24 kV. Overload relay calibration and testing is not covered by this standard.
- 3 Terms and definitions: Added definitions for capacitor switching classes.
- 4.1 Rated voltage: Added 15, 17,5 and 24 kV as standard voltage values.
- 4.109.2 Starting duty of reduced-voltage starters: Added ratings for autotransformer and reactor starters (was in the testing section).

- 4.112 Rated capacitive switching currents: Added capacitor switching current ratings.
- 5.101 Protective relays: Removed the requirements for overload relays. This section is obsolete since there are only a few MV starters fitted with thermal overload relays and electronic relays have their own standards.
- 6.2.5 Application of the test voltage and test conditions (former 6.2.2 b)): Changed wording of requirement for impulse across the open gap of vacuum contactors.
- 6.4.2 Auxiliary circuits: The requirement for resistance checks of auxiliary circuits was deleted.
- 6.5.5.104 Temperature rise of the auto-transformer or reactor for two-step auto-transformer or reactor starters: Reworded to transfer ratings to subclause 4.109.2.
- 6.102.9 Condition following making and breaking tests: Gave specific direction as to what the tolerance should be based on where the resistance was to be checked.
- 6.104 Short-circuit current making and breaking tests: Clarified test conditions for short-circuit testing.
- 6.109 Capacitive current switching tests: Added capacitive current switching tests.
- Annex B: Added Table B.1 – Tolerances on test quantities for type test.

This standard is to be read in conjunction with IEC 62271-1:2007, to which it refers and 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 is used as in IEC 62271-1. Amendments to these clauses and subclauses are given under the same references whilst additional subclauses are numbered from 101.

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

FDIS	Report on voting
17A/971/FDIS	17A/976/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 2.

The list of all parts of the IEC 62271 series under the general title, *High-voltage switchgear and controlgear*, can be found on the IEC website.

The committee has decided that the contents of this 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.

HIGH-VOLTAGE SWITCHGEAR AND CONTROLGEAR –

Part 106: Alternating current contactors, contactor-based controllers and motor-starters

1 General

1.1 Scope and object

This part of IEC 62271 is applicable to a.c. contactors and/or contactor-based controllers and 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 24 000 V.

It is applicable only to three-pole devices for use in three-phase systems, and single-pole devices 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 typically do not have adequate short-circuit interruption capability. In this context, this standard gives requirements for

- motor starters associated with separate short-circuit protective devices;
- controllers - contactors combined with short-circuit protective devices (SCPD).

Contactors intended for closing and opening electric circuits and, if combined with suitable relays, for protecting these circuits against operating overloads 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.

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 62271-200.

NOTE 4 Disconnectors and earthing switches are covered by IEC 62271-102.

NOTE 5 High-voltage switches above 1 kV and less than 52 kV are covered by IEC 62271-103¹.

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

IEC 60417, *Graphical symbols for use on equipment*

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

IEC 62271-1:2007, *High-voltage switchgear and controlgear – Part 1: Common specifications*

IEC 62271-100:2008, *High-voltage switchgear and controlgear – Part 100: Alternating-current circuit-breakers*

¹ To be published

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