IEC 62271-107

Edition 3.0 2019-05

INTERNATIONAL STANDARD

NORME INTERNATIONALE

High-voltage switchgear and controlgear – Part 107: Alternating current fused circuit-switchers for rated voltages above 1 kV up to and including 52 kV

Appareillage à haute tension – Partie 107: Circuits-switchers à fusibles pour courant alternatif de tension assignée supérieure à 1 kV et jusqu'à 52 kV inclus

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HIGH-VOLTAGE SWITCHGEAR AND CONTROLGEAR –

Part 107: Alternating current fused circuit-switchers for rated voltages above 1 kV up to and including 52 kV

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International Standard IEC 62271-107 has been prepared by subcommittee 17A: Switching devices, of IEC technical committee 17: High-voltage switchgear and controlgear

This third edition cancels and replaces the second edition published in 2012. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

a) technical changes introduced by the second edition of IEC 62271-1 are applied, where relevant;

b) rated TRV is removed and TRV is now treated as a test parameter, as in IEC 62271-100;

c) the term "thermal current" is no longer used; the rated continuous current is linked to the installed fuse-links, and values shall be provided by the manufacturer together with the list of the acceptable fuse-links; for tests purpose, the highest rated continuous current listed

is referred, where previously the wording was "rated maximum thermal current", for consistency with IEC 62271-105;

d) making and breaking test duties are independent type tests (as some may be omitted if the switching device has been validated as a load-break switch). However, TD_{lt0} and TD_{llow} are kept as a sequence as they are linked to the same rated value (I_{t0});

e) differentiation has been introduced between requirements expressed for fulfilling the function expected from a fused circuit-switcher, from requirements only relevant when the function is performed by a stand-alone device. The goal is to avoid duplication or conflicts of requirements with a standard dealing with assemblies, when the function is implemented within such an assembly.

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

FDIS	Report on voting
17A/1216/FDIS	17A/1227/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.

This International Standard is to be read in conjunction with IEC 62271-1:2017, to which it refers and which is applicable unless otherwise specified. 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 numbering, whilst additional subclauses, are numbered from 101.

Particular conditions existing in certain countries are listed in Annex B.

A list of all parts in the IEC 62271 series, published 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 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.

INTRODUCTION

Earthing switches forming an integral part of a circuit-switcher are covered by IEC 62271-102 [1][1].

Installation in enclosure, if any, is covered either by IEC 62271-200 [2] or by IEC 62271-201 [3].

[1] Numbers in square brackets refer to the Bibliography.

HIGH-VOLTAGE SWITCHGEAR AND CONTROLGEAR –

Part 107: Alternating current fused circuit-switchers for rated voltages above 1 kV up to and including 52 kV

1 Scope

This part of IEC 62271 applies to three-pole-operated fused circuit-switchers designed with rated voltages above 1 kV up to and including 52 kV for use on three-phase alternating current systems of either 50 Hz or 60 Hz.

They can be designed either as stand-alone devices, or be embedded in a switchgear and controlgear assembly.

They are intended to be used for circuits or applications requiring only a normal mechanical and electrical endurance capability. Such applications cover protection of HV/LV transformers for instance, but exclude distribution lines or cables, as well as motor circuits and capacitor bank circuits.

Short-circuit conditions with low currents, up to the fused circuit-switcher rated take-over current, are dealt with by supplementary devices (strikers, relays, etc.), properly arranged, tripping the circuit-switcher. Current-limiting fuses are incorporated in order to ensure that the short-circuit breaking capacity of the device is above that of the circuit-switcher alone.

NOTE 1 In this document, the term "fuse" is used to designate either the fuse or the fuse-link where the general meaning of the text does not result in ambiguity.

NOTE 2 Other circuit-switchers exist; see reference [4].

Devices that require a dependent manual operation are not covered by this document.

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.

IEC 60282-1:2009, *High-voltage fuses – Part 1: Current-limiting fuses*
IEC 60282-1:2009/AMD1:2014

IEC 62271-1:2017, *High-voltage switchgear and controlgear – Part 1: Common specifications*

IEC 62271-100:2008, *High-voltage switchgear and controlgear – Part 100: Alternating-current circuit-breakers*
IEC 62271-100:2008/AMD1:2012
IEC 62271-100:2008/AMD2:2017

IEC 62271-103:2011, *High-voltage switchgear and controlgear – Part 103: Switches for rated voltages above 1 kV up to and including 52 kV*

IEC 62271-105:2012, *High-voltage switchgear and controlgear – Part 105: Alternating current switch-fuse combinations for rated voltages above 1 kV up to and including 52 kV*

3 Terms and definitions

For the purposes of this document, the following terms and definitions 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

NOTE IEC Electropedia lists the terms defined in the IEC 60050 [5].

3.1 General terms and definitions

Subclause 3.1 of IEC 62271-1:2017 applies.

3.2 Assemblies of switchgear and controlgear

Subclause 3.2 of IEC 62271-1:2017 applies.

3.3 Parts of assemblies

Subclause 3.3 of IEC 62271-1:2017 applies.

3.4 Switching devices

Subclause 3.4 of IEC 62271-1:2017 applies with the following additions.

3.4.101
circuit-switcher

mechanical switching device suitable for making, carrying and interrupting currents under normal circuit conditions and for interrupting specified fault currents that are usually smaller than its short-time withstand current

Note 1 to entry: Other circuit-switchers exist; see reference [4].

3.4.102
fused circuit-switcher
combination, in a single device or function, of a circuit-switcher and fuses, one fuse being placed in series with each pole of the circuit-switcher intended to be connected to a phase conductor

Note 1 to entry: the term "one fuse" does not preclude the use of several fuse-links in parallel.

3.4.103
fused circuit-switcher base
fused circuit-switcher without fuse-links mounted

3.5 Parts of switchgear and controlgear

Subclause 3.5 of IEC 62271-1:2017 applies, with the following additions.

3.5.101
release
<of a mechanical switching device> device, mechanically connected to a mechanical switching device, which releases the holding means and permits the opening or the closing of the switching device

[SOURCE: IEC 60050-441:2000, 441-15-17]

3.5.102
shunt release
release energized by a source of voltage

Note 1 to entry: The source of voltage may be independent of the voltage of the main circuit.

[SOURCE: IEC 60050-441:2000, 441-16-41]

3.6 Operational characteristics of switchgear and controlgear

Subclause 3.6 of IEC 62271-1:2017 applies, with the following additions.

3.6.101
independent manual operation
<of a mechanical switching device> 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]

3.6.102
stored energy operation
<of a mechanical switching device> operation by means of energy stored in the mechanism itself prior to the completion of the operation and sufficient to complete it under predetermined conditions

Note 1 to entry: This kind of operation may be subdivided according to:

1) The manner of storing the energy (spring, weight, etc.);
2) The origin of the energy (manual, electric, etc.);
3) The manner of releasing the energy (manual, electric, etc.).

[SOURCE: IEC 60050-441: 2000, 441-16-15]

3.7 Characteristic quantities

Subclause 3.7 of IEC 62271-1:2017 applies, with the following additions.

3.7.101
prospective current
<of a circuit and with respect to a switching device or a fuse> current that would flow in the circuit if each pole of the switching device or the fuse were replaced by a conductor of negligible impedance

Note 1 to entry: The method to be used to evaluate and to express the prospective current is to be specified in the relevant publications.

[SOURCE: IEC 60050-441:2000, 441-17-01]

3.7.102
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 made by an ideal switching device, i.e. with instantaneous transition from infinite to zero impedance. For circuits where the current can follow several different paths, e.g. polyphase circuits, it further assumes that the current is made simultaneously in all poles, even if only the current in one pole is considered.

[SOURCE: IEC 60050-441:2000, 441-17-02]

3.7.103
maximum prospective peak current
<of an AC circuit> prospective peak current when initiation of the current takes place at the instant which leads to the highest possible value

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

[SOURCE: IEC 60050-441:2000, 441-17-04]

3.7.104
prospective breaking current
<for a pole of a switching device or a fuse> prospective current evaluated at a time corresponding to the instant of the initiation of the breaking process

Note 1 to entry: Specifications concerning the instant of the initiation of the breaking process are to be found in the relevant publications. For mechanical switching devices or fuses, it is usually defined as the moment of initiation of the arc during the breaking process.

[SOURCE: IEC 60050-441:2000, 441-17-06]

3.7.105
breaking current
<of a switching device or a fuse> current in a pole of a switching device or in a fuse at the instant of initiation of the arc during a breaking process

[SOURCE: IEC 60050-441:2000, 441-17-07]

3.7.106
minimum breaking current

minimum value of prospective current that a fuse-link is capable of breaking at a stated voltage under prescribed conditions of use and behaviour

[SOURCE: IEC 60050-441:2000, 441-18-29]

3.7.107
short-circuit making capacity
making capacity for which the prescribed conditions include a short circuit at the terminals of the switching device

[SOURCE: IEC 60050-441:2000, 441-17-10]

3.7.108
take-over current
current co-ordinate of the intersection between the time-current characteristics of two over-current protective devices

[SOURCE: IEC 60050-441:2000, 441-17-16]

3.7.109
fused short-circuit current
conditional short-circuit current when the current-limiting device is a fuse

[SOURCE: IEC 60050-441:2000, 441-17-21]

3.7.110
applied voltage
<for a switching device> voltage which exists across the terminals of a pole of a switching device just before the making of the current

[SOURCE: IEC 60050-441:2000, 441-17-24]

3.7.111
recovery voltage
voltage which appears across the terminals of a pole of a switching device or a fuse 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 power frequency or the steady-state recovery voltage alone exists.

[SOURCE: IEC 60050-441:2000, 441-17-25]

3.7.112
transient recovery voltage
TRV
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 the switching device. It includes the voltage shift of the neutral of a polyphase circuit.

Note 2 to entry: The transient recovery voltages in three-phase circuits is, unless otherwise stated, that across the first pole to clear, because this voltage is generally higher than that which appears across each of the other two poles.

[SOURCE: IEC 60050-441:2000, 441-17-26]

3.7.113
power frequency recovery voltage
recovery voltage after the transient voltage phenomena have subsided

[SOURCE: IEC 60050-441:2000, 441-17-27]

3.7.114
prospective transient recovery voltage
<of a circuit> transient recovery voltage following the breaking of the prospective symmetrical current by an ideal switching device

Note 1 to entry: The definition assumes that the switching device or the fuse, for which the prospective transient recovery voltage is sought, is replaced by an ideal switching device, i.e. having instantaneous transition from zero to infinite impedance at the very instant of zero current, i.e. at the "natural" zero. For circuits where the current can follow several different paths, e.g. a polyphase circuit, the definition further assumes that the breaking of the current by the ideal switching device takes place only in the pole considered.

[SOURCE: IEC 60050-441:2000, 441-17-29]

3.7.115
opening time
<of a mechanical switching device> interval of time between the specified instant of initiation of the opening operation and the instant when the arcing contacts have separated in all poles

Note 1 to entry: For release operation, instant of initiation is taken as the instant of application of power supply on the release

[SOURCE: IEC 60050-441:2000, 441-17-36, modified – The initial note has been deleted and the current note added.]