

INTERNATIONAL STANDARD



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

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CONTENTS

FOREWORD.....	6
1 General.....	8
1 Scope.....	8
2 Normative references	9
3 Terms and definitions	9
3.1 General terms and definitions	10
3.2 Assemblies of switchgear and controlgear	10
3.3 Parts of assemblies	10
3.4 Switching devices	10
3.5 Parts of switchgear and controlgear	11
3.6 Operational characteristics of switchgear and controlgear.....	11
3.7 Characteristic quantities	12
3.101 Fuses.....	16
4 Normal and special service conditions	17
5 Ratings.....	17
5.1 General.....	17
5.2 Rated voltage (U_r)	17
5.3 Rated insulation level (U_d , U_p , U_S)	17
5.4 Rated frequency (f_r).....	17
5.5 Rated normal current and temperature rise Rated continuous current (I_r).....	18
5.6 Rated short-time withstand current (I_k)	18
5.7 Rated peak withstand current (I_p)	18
5.8 Rated duration of short-circuit (t_k).....	18
5.9 Rated supply voltage of closing and opening devices and of auxiliary and control circuits (U_a).....	18
5.10 Rated supply frequency of closing and opening devices and of auxiliary and control circuits	18
4.11 Rated filling levels for insulation and/or operation.....	19
5.11 Rated pressure of compressed gas supply for controlled pressure systems	19
5.101 Rated short-circuit breaking current	19
4.102 Rated transient recovery voltage.....	19
5.102 Rated short-circuit making current	19
5.103 Rated transfer current (striker operation) ($I_{rtransfer}$).....	20
5.104 Rated take-over current for release-operated combinations ($I_{te}I_{rto}$).....	20
6 Design and construction	20
6.1 Requirements for liquids in switch-fuse combinations.....	20
6.2 Requirements for gases in switch-fuse combinations	20
6.3 Earthing of switch-fuse combinations	20
6.4 Auxiliary and control equipment and circuits	20
6.5 Dependent power operation	20
6.6 Stored energy operation.....	20
6.7 Independent manual or power operation (independent unlatched operation) Independent unlatched operation (independent manual or power operation)	20
6.8 Manually operated actuators	21

6.9	Operation of releases.....	21
5.9	Low and high pressure interlocking and monitoring devices	21
6.10	Pressure/level indication	21
6.11	Nameplates.....	21
6.12	Interlocking Locking devices	23
6.13	Position indication.....	23
6.14	Degrees of protection provided by enclosures.....	23
6.15	Creepage distances for outdoor insulators	23
6.16	Gas and vacuum tightness	23
6.17	Liquid tightness Tightness for liquid systems	23
6.18	Fire hazard (flammability)	23
6.19	Electromagnetic compatibility (EMC).....	23
6.20	X-ray emission.....	23
6.21	Corrosion.....	24
6.22	Filling levels for insulation, switching and/or operation.....	24
6.101	Linkages between the fuse striker(s) and the switch release	24
6.102	Low over-current conditions (long fuse-pre-arcing time conditions)	24
7	Type tests	24
7.1	General.....	24
7.1.1	Basics	24
7.1.2	Information for identification of specimens test objects	25
7.1.3	Information to be included in type-test reports	25
7.2	Dielectric tests	26
7.3	Radio interference voltage (RIV) test	26
7.4	Measurement of the resistance of circuits Resistance measurement	26
7.5	Temperature-rise Continuous current tests	26
7.6	Short-time withstand current and peak withstand current tests	27
7.7	Verification of the protection	27
7.8	Tightness tests	27
7.9	Electromagnetic compatibility tests (EMC)	27
7.10	Additional tests on auxiliary and control circuits	27
7.11	X-radiation test procedure for vacuum interrupters.....	27
7.101	Making and breaking tests	27
7.101.1	General	27
7.101.2	Conditions for performing the tests	28
7.101.3	Test-duty procedures.....	35
7.101.4	Behaviour of the combination during tests	40
7.101.5	Condition of the apparatus after testing	41
7.102	Mechanical operation tests	42
7.103	Mechanical shock tests on fuses.....	43
7.104	Thermal test with long pre-arcing time of fuse.....	43
7.105	Extension of validity of type tests.....	43
7.105.1	Dielectric	43
7.105.2	Continuous current tests.....	44
7.105.3	Making and breaking	44
8	Routine tests	44
8.101	Mechanical operating tests	44
9	Guide to the selection of switch-fuse combinations (informative)	45
9.101	Guide to the selection of switch-fuse combination for transformer protection.....	45

9.101.1	General	45
9.101.2	Rated short-circuit breaking current	46
9.101.3	Primary fault condition caused by a solid short-circuit on the transformer secondary terminals	46
9.102	Coordination of switch and fuses for extension of the reference list of fuses	47
9.102.1	General	47
9.102.2	Rated normal continuous current	47
9.102.3	Low over-current performance	48
9.102.4	Transfer current	48
9.102.5	Take-over current	48
9.102.6	Extension of the validity of type tests	48
8.103 – Operation		
10	Information to be given with enquiries, tenders and orders (informative)	49
10.1	General	49
10.2	Information with enquiries and orders	49
10.3	Information with tenders	49
11	Transport, storage, installation, operation operating instructions and maintenance	50
12	Safety	50
13	Influence of the product on the environment	51
Annex A (informative) Example of the coordination of fuses, switch and transformer		52
Annex B (normative) Procedures for determining transfer current		55
B.1	Background	55
B.2	Mathematical determination of ΔT	55
B.3	Simplified method for determination of transfer current	58
Annex C (normative) Tolerances on test quantities for type tests		60
Bibliography		62
IEC 62271-105:2021		
https://standards.iteh.ai/catalog/standards/iec/c4f7e4db-ef15-42a5-ae88-e27389623c75/iec-62271-105-2021		
Figure 1	– Arrangement of test circuits for test duties $TD_{I_{SC}}$ and $TD_{I_{Wmax}}$	30
Figure 2	– Arrangement of test circuits for test-duty $TD_{I_{transfer}}$	30
Figure 3	– Arrangement of test circuits for test-duty $TD_{I_{to}}$	31
Figure 4	– Determination of power-frequency recovery voltage	33
Figure 5	– Representation of a specified TRV by a two-parameter reference line and a delay line	34
Figure 6	– Example of a two-parameter reference line for a TRV	35
Figure 7	– Characteristics for determining take-over current	39
Figure 8	– Transfer current in relation to the primary fault current I_{SC} due to a solid short circuit in the transformer secondary terminal	47
Figure A.1	– Characteristics relating to the protection of an 11 kV, 400 kVA transformer	53
Figure A.2	– Discrimination between HV and LV fuses	54
Figure B.1	– Practical determination of the transfer current	56
Figure B.2	– Determination of the transfer current with the iterative method	58
Table 1	– Nameplate markings information	22
Table 2	– Summary of the conditions for combining tests and alternative procedures	29

Table 3 – Standard Values of prospective TRV for test-duty $TD_{Itransfer}$ based on practice in Europe.....	38
Table 4 – Standard Values of prospective TRV for test-duty $TD_{Itransfer}$ based on practice in the United States of America of America and Canada	38
Table 5 – Summary of test parameters for test duties	40
Table C.1 – Tolerances on test quantities for type tests	60

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[IEC 62271-105:2021](https://standards.iteh.ai/catalog/standards/iec/c4f7e4db-ef15-42a5-ae88-e27389623c75/iec-62271-105-2021)

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

HIGH-VOLTAGE SWITCHGEAR AND CONTROLGEAR –

Part 105: Alternating current switch-fuse combinations for rated voltages above 1 kV up to and including 52 kV

FOREWORD

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This redline version of the official IEC Standard allows the user to identify the changes made to the previous edition IEC 62271-105:2012. A vertical bar appears in the margin wherever a change has been made. Additions are in green text, deletions are in strikethrough red text.

IEC 62271-105 has been prepared by subcommittee 17A: Switching devices, of IEC technical committee 17: High-voltage switchgear and controlgear. It is an International Standard.

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) the document has been updated to be in alignment with the second edition of IEC 62271-1:2017;
- b) rated TRV has been removed (TRV is only a test parameter), as in the latest revision of IEC 62271-100;
- c) differentiation has been introduced between requirements expressed for fulfilling the function expected from a switch-fuse combination, 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 the following documents:

FDIS	Report on voting
17A/1300/FDIS	17A/1306/RVD

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

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/standardsdev/publications.

This document 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 62271-1:2017. Amendments to these clauses and subclauses are given under the same numbering, whilst additional subclauses are numbered from 101.

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 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.

HIGH-VOLTAGE SWITCHGEAR AND CONTROLGEAR –

Part 105: Alternating current switch-fuse combinations for rated voltages above 1 kV up to and including 52 kV

1 General

1 Scope

~~Subclause 1.1 of IEC 62271-1:2007 is not applicable, and is replaced as follows:-~~

This part of IEC 62271 applies to three-pole units for public and industrial distribution systems which are functional assemblies of switches ~~including~~ composed of switches or switch-disconnectors and current-limiting fuses designed so as to be capable of

- breaking, at the rated ~~recovery~~ voltage, any current up to and including the rated short-circuit breaking current;
- making, at the rated voltage, circuits to which the rated short-circuit breaking current applies.

~~It does not apply to fuse-circuit breakers, fuse contactors, combinations for motor-circuits or to combinations incorporating single capacitor bank switches.~~

It does not apply to combinations of fuses with circuit-breakers, contactors or circuit switchers, nor for combinations for motor-circuits nor to combinations incorporating single capacitor bank switches.

This document applies to combinations 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.

In this document, the word "combination" is used for a combination in which the components constitute a functional assembly. Each association of a given type of switch and a given type of fuse defines one type of switch-fuse combination. ~~In practice,~~ Different types of fuses ~~may~~ can be combined with one type of switch, which give several combinations with different characteristics, in particular concerning the rated continuous currents. ~~Moreover, for maintenance purposes, the user should know the types of fuses that can be combined to a given switch without impairing compliance to the standard, and the corresponding characteristics of the so-made combination.~~

A switch-fuse combination is ~~then~~ therefore defined by its type designation and a list of selected fuses defined by the manufacturer, the so-called "reference list of fuses". Compliance with this document of a given combination means that every combination using one of the selected fuses is proven to be in compliance with this document.

The fuses are incorporated in order to extend the short-circuit breaking rating of the combination beyond that of the switch alone. They are fitted with strikers in order both to open automatically all three poles of the switch on the operation of a fuse and to achieve a correct operation at values of fault current above the minimum melting current but below the minimum breaking current of the fuses. In addition to the fuse strikers, the combination ~~may~~ can be fitted with either an over-current release or a shunt release.

NOTE 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.

~~This standard applies to combinations 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.~~

Fuses are ~~covered by~~ in accordance with IEC 60282-1:2020.

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

Switches, including their specific mechanism, ~~shall be~~ are in accordance with IEC 62271-103 except for the short-time current and short-circuit making requirements where the current-limiting effects of the fuses are taken into account.

Earthing switches forming an integral part of a combination are covered by IEC 62271-102.

In addition, switches which include other functions (not covered by IEC 62271-103) are covered by their relevant standards (e.g. IEC 62271-102 for disconnectors and earthing switches).

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.

~~Subclause 1.2 of IEC 62271-1:2007 is applicable with the following additions:~~

Clause 2 of IEC 62271-1:2017 applies with the following additions:

IEC 60050-441, *International Electrotechnical Vocabulary (IEV) – Part 441: Switchgear, controlgear and fuses* (available at <http://www.electropedia.org>)

IEC 60282-1:2009/2020, *High-voltage fuses – Part 1: Current-limiting fuses*

~~IEC/TR 60787:2007, *Application guide for the selection of high-voltage current-limiting fuse-links for transformer circuits*~~

IEC 62271-1:2007/2017, *High-voltage switchgear and controlgear – Part 1: Common specifications for alternating current switchgear and controlgear*

IEC 62271-100:2008/2021, *High-voltage switchgear and controlgear – Part 100: Alternating-current circuit-breakers*

IEC 62271-102:2004/2018, *High-voltage switchgear and controlgear – Part 102: Alternating current disconnectors and earthing switches*

IEC 62271-103:2014/2021, *High-voltage switchgear and controlgear – Part 103: Switches for rated voltages above 1 kV up to and including 52 kV*

3 Terms and definitions

~~Clause 3 of IEC 62271-1:2007 is applicable with the the following additions.~~

For the purposes of this document, the terms and definitions given in IEC 60050-441 and the following 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 Some of the terms given in IEC 60050-441 are listed hereunder.

3.1 General terms and definitions

~~Subclause 3.1 of IEC 62271-1:2007 is applicable.~~

Subclause 3.1 of IEC 62271-1:2017 applies.

3.2 Assemblies of switchgear and controlgear

~~Subclause 3.2 of IEC 62271-1:2007 is applicable.~~

Subclause 3.2 of IEC 62271-1:2017 applies.

3.3 Parts of assemblies

~~Subclause 3.3 of IEC 62271-1:2007 is applicable.~~

Subclause 3.3 of IEC 62271-1:2017 applies.

3.4 Switching devices

~~Subclause 3.4 of IEC 62271-1:2007 is applicable, with the following additions~~

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

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3.4.101

switch-fuse combination

combination of a three-pole switch with three fuses provided with strikers, the operation of any striker causing all three poles of the switch to open automatically

Note 1 to entry: The switch-fuse combination includes the fuse-switch combination.

3.4.102

switch-fuse combination base combination base

switch-fuse combination without fuse-links mounted

3.4.103

switch-fuse

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

[SOURCE: IEC 60050-441:2007/2000, 441-14-14]

3.4.104

fuse-switch

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

[SOURCE: IEC 60050-441:2007/2000, 441-14-17]

**3.4.105
switch-disconnector**

switch which, in the open position, satisfies the isolating requirements specified for a disconnector

[SOURCE: IEC 60050-441:20072000, 441-14-12]

**3.4.106
release-operated combination**

combination in which automatic opening of the switch can also be initiated by either an over-current release or a shunt release

3.5 Parts of switchgear and controlgear

~~Subclause 3.5 of IEC 62271-1:2007 is applicable, with the following additions.~~

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 60050-441:20072000, 441-15-17]

**3.5.102
over-current release**

release which permits a mechanical switching device to open with or without time-delay when the current in the release exceeds a predetermined value

Note 1 to entry: This value can in some cases depend upon the rate-of-rise of current.

[SOURCE: IEC 60050-441:20072000, 441-16-33]

**3.5.103
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 60050-441:20072000, 441-16-41]

3.6 Operational characteristics of switchgear and controlgear

~~Subclause 3.6 of IEC 62271-1:2007 is applicable, 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 60050-441:2007, 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 to entry: This kind of operation may be subdivided according to:~~

- ~~a) The manner of storing the energy (spring, weight, etc.);~~
- ~~b) The origin of the energy (manual, electric, etc.);~~
- ~~c) The manner of releasing the energy (manual, electric, etc.);~~

~~[SOURCE: IEC 60050-441:2007, 441-16-15]~~

Subclause 3.6 of IEC 62271-1:2017 applies.

3.7 Characteristic quantities

~~Subclause 3.7 of IEC 62271-1:2007 is applicable, with the following additions.~~

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 60050-441:20072000, 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 60050-441:20072000, 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 60050-441:20072000, 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 60050-441:2007, 441-17-06]~~