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

INTERNATIONAL
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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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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

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.
2) The formal decisions or agreements of 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 IEC National Committees.
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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:~~2001~~2018, *High-voltage switchgear and controlgear – Part 102: Alternating current disconnectors and earthing switches*

IEC 62271-103:~~2011~~2021, *High-voltage switchgear and controlgear – Part 103: Switches for rated voltages above 1 kV up to and including 52 kV*

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NORME INTERNATIONALE

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

Appareillage à haute tension – Partie 105: Combinés interrupteurs-fusibles pour courant alternatif de tensions assignées supérieures à 1 kV et jusqu'à 52 kV inclus



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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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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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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.

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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.

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- 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 Scope

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

– breaking, at the rated 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 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. Different types of fuses can be combined with one type of switch, which give several combinations with different characteristics, in particular concerning the rated continuous currents.

A switch-fuse combination is 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 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.

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

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

Switches, including their specific mechanism, 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.

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

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

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

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

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

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COMMISSION ÉLECTROTECHNIQUE INTERNATIONALE

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APPAREILLAGE À HAUTE TENSION –

Partie 105: Combinés interrupteurs-fusibles pour courant alternatif de tensions assignées supérieures à 1 kV et jusqu'à 52 kV inclus

AVANT-PROPOS

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L'IEC 62271-105 a été établie par le sous-comité 17A: Appareils de connexion, du comité d'études 17 de L'IEC: Appareillage haute tension. Il s'agit d'une norme internationale.

Cette troisième édition annule et remplace la deuxième édition parue en 2012. Cette édition constitue une révision technique.

Cette édition inclut les modifications techniques majeures suivantes par rapport à l'édition précédente:

a) le document a été mis à jour conformément à la 2e édition de l'IEC 62271-1:2017;
b) la TTR assignée est supprimée (la TTR n'est qu'un paramètre d'essai) comme dans la dernière édition de l'IEC 62271-100;

c) une distinction est désormais faite entre les exigences spécifiées pour l'exécution de la fonction attendue d'un combiné interrupteur-fusibles, et les exigences qui ne sont pertinentes que lorsque la fonction est exécutée par un appareil autonome. Cette distinction a pour but d'éviter des répétitions ou des contradictions d'exigences avec une norme traitant d'ensembles, lorsque la fonction est mise en œuvre au sein d'un tel ensemble.

Le texte de cette Norme internationale est issu des documents suivants:

FDIS	Rapport de vote
17A/1300/FDIS	17A/1306/RVD

Le rapport de vote indiqué dans le Tableau ci-dessus donne toute information sur le vote ayant abouti à son approbation.

La version française de la norme n'a pas été soumise au vote.

La langue employée pour l'élaboration de cette Norme internationale est l'anglais.

Ce document a été rédigé selon les Directives ISO/IEC, Partie 2, il a été développé selon les Directives ISO/IEC, Partie 1 et les Directives ISO/IEC, Supplément IEC, disponibles sous www.iec.ch/members_experts/refdocs. Les principaux types de documents développés par l'IEC sont décrits plus en détail sous www.iec.ch/standardsdev/publications.

Ce document doit être lu conjointement avec l'IEC 62271-1:2017, à laquelle il fait référence et qui est applicable, sauf spécification contraire. Pour faciliter le repérage des exigences correspondantes, cette norme utilise une numérotation identique des articles et des paragraphes à celle de l'IEC 62271-1:2017. Les modifications à ces articles et paragraphes sont indiquées sous la même numérotation, alors que les paragraphes additionnels sont numérotés à partir de 101.

Une liste de toutes les parties de la série IEC 62271, publiées sous le titre général *Appareillage à haute tension*, peut être consultée sur le site web de l'IEC.

Le comité a décidé que le contenu de ce document ne sera pas modifié avant la date de stabilité indiquée sur le site web de l'IEC sous webstore.iec.ch dans les données relatives au document recherché. À cette date, le document sera

- reconduit,
- supprimé,
- remplacé par une édition révisée, ou
- amendé.

APPAREILLAGE À HAUTE TENSION –

Partie 105: Combinés interrupteurs-fusibles pour courant alternatif de tensions assignées supérieures à 1 kV et jusqu'à 52 kV inclus

1 Domaine d'application

La présente partie de l'IEC 62271 est applicable aux appareils tripolaires utilisés dans les réseaux de distribution publics ou les installations industrielles. Ces derniers forment des ensembles fonctionnels composés d'interrupteurs ou d'interrupteurs-sectionneurs et de fusibles limiteurs de courant, conçus pour être capables de

– couper, à la tension assignée, tous les courants jusqu'au pouvoir de coupure assigné en court-circuit inclus;
– établir, à la tension assignée, des circuits pour lesquels le pouvoir de coupure assigné en court-circuit s'applique.

Elle ne s'applique ni aux combinés de fusibles avec des disjoncteurs, des contacteurs ou des circuits-switchers, ni aux combinés destinés à la manœuvre et à la protection des moteurs, ni aux combinés destinés à la manœuvre et à la protection des batteries de condensateurs.

Le présent document s'applique aux combinés prévus pour des tensions assignées supérieures à 1 kV et inférieures ou égales à 52 kV, et destinés à être utilisés sur des réseaux triphasés à courant alternatif à 50 Hz ou 60 Hz.

Dans le présent document, le mot "combiné" désigne un combiné dans lequel les composants forment un ensemble fonctionnel. Chaque association d'un type donné d'interrupteur avec un type donné de fusible définit un type de combiné interrupteur-fusibles. Différents types de fusibles peuvent être combinés avec un type donné d'interrupteur, ce qui donne plusieurs combinés de caractéristiques différentes, en particulier pour ce qui concerne les courants permanents assignés.

Un combiné interrupteur-fusibles est donc défini par sa désignation de type, ainsi qu'une liste de fusibles utilisables définie par le fabricant appelée "liste des fusibles de référence". Un combiné est réputé satisfaire au présent document dans la mesure où la conformité à celui-ci a été démontrée pour tous les combinés équipés de l'un des fusibles utilisables.

Les fusibles sont introduits dans le combiné en vue d'obtenir des caractéristiques de coupure assignées en court-circuit supérieures à celles du seul interrupteur. Ces fusibles comportent des percuteurs destinés à provoquer l'ouverture automatique des trois pôles de l'interrupteur par suite du fonctionnement d'un fusible, permettant ainsi d'assurer le bon fonctionnement du combiné pour des valeurs de courant de défaut supérieures au courant minimal de fusion et inférieures au courant minimal de coupure de ces fusibles. En plus des percuteurs des fusibles, les combinés peuvent également être équipés soit d'un déclencheur à maximum de courant, soit d'un déclencheur shunt.

NOTE Dans le présent document, le terme "fusible" est utilisé pour désigner soit le fusible, soit l'élément de remplacement, quand le sens général du texte ne comporte aucune ambiguïté.

Les fusibles sont conformes à l'IEC 60282-1:2020.

Les dispositifs qui exigent une manœuvre dépendante manuelle ne sont pas traités par le présent document.

Les interrupteurs, y compris leurs mécanismes de manœuvre, sont conformes à l'IEC 62271-103, sauf en ce qui concerne les exigences relatives au courant de courte durée admissible et au pouvoir de fermeture sur court-circuit, pour lesquelles l'effet limiteur des fusibles est pris en compte.

Les sectionneurs de terre incorporés dans le combiné répondent aux spécifications de l'IEC 62271-102.

Les interrupteurs qui incluent d'autres fonctions (non couvertes par l'IEC 62271-103) sont couverts par leurs normes applicables (par exemple, IEC 62271-102 Sectionneurs et sectionneurs de terre).

2 Références normatives

Les documents suivants sont cités dans le texte de sorte qu'ils constituent, pour tout ou partie de leur contenu, des exigences du présent document. Pour les références datées, seule l'édition citée s'applique. Pour les références non datées, la dernière édition du document de référence s'applique (y compris les éventuels amendements).

L'Article 2 de l'IEC 62271-1:2017 s'applique avec les ajouts suivants:

IEC 60050-441, *Vocabulaire Electrotechnique International (IEV) – Part 441: Appareillage et fusibles* (disponible à l'adresse http://www.electropedia.org)

IEC 60282-1:2020*, Fusibles à haute tension – Partie 1: Fusibles limiteurs de courant*

IEC 62271-1:2017, *Appareillage à haute tension – Partie 1: Spécifications communes pour appareillage à courant alternatif*

IEC 62271-100:2021*, High-voltage switchgear and controlgear – Part 100: Alternating-current circuit-breakers* (disponible en anglais seulement)

IEC 62271-102:2018, *Appareillage à haute tension – Partie 102: Sectionneurs et sectionneurs de terre à courant alternatif*

IEC 62271-103:2021, *High-voltage switchgear and controlgear – Part 103: Alternating current switches for rated voltages above 1 kV up to and including 52 kV* (disponible en anglais seulement)