IEC 62271-200

Edition 2.0 2011-10

INTERNATIONAL STANDARD

NORME INTERNATIONALE

colour inside

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

Appareillage à haute tension –
Partie 200: Appareillage sous enveloppe métallique pour courant alternatif de tensions assignées supérieures à 1 kV et inférieures ou égales à 52 kV

IEC 62271-200:2011

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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 62271-200 has been prepared by subcommittee 17C: High-voltage switchgear and controlgear assemblies, of IEC technical committee 17: Switchgear and controlgear.

This second edition cancels and replaces the first edition, published in 2003. It is a technical revision.

This second edition of IEC 62271-200 has been further updated and improved to the experience gained with the first edition of IEC 62271-200. As maintenance result, this second edition of IEC 62271-200 introduces the following significant changes:

- definitions, classifications and testing procedures are specified more precisely;
- categories LSC2A and LSC2B have been clarified and LSC2 has been assigned a separate definition;
- specific ratings related to fault level to earth (4.5 to 4.7) are introduced;

- solid insulated high-voltage parts are no longer considered as compartments on their own;
- an optional rating "cable test voltage" and the associated requirements and type tests are introduced;
- for testing the internal arc classification, when assigned by the manufacturer, more specific guidance is provided regarding the test arrangement, room simulation and arc initiation;
- a single phase to earth ignition is also recognised for internal arc testing;
- the Annexes A and B are renumbered Annexes AA and BB.

The level of severity of internal arc testing is maintained without changes.

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

FDIS	Report on voting
17C/523/FDIS	17C/534/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.

This International Standard should be read in conjunction with IEC 62271-1:2007, 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.

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

The contents of the corrigendum of June 2015 have been included in this copy.

IMPORTANT – The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

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

1 General

1.1 Scope

This part of IEC 62271 specifies requirements for prefabricated metal-enclosed switchgear and controlgear for alternating current of rated voltages above 1 kV and up to and including 52 kV for indoor and outdoor installation, and for service frequencies up to and including 60 Hz. Enclosures may include fixed and removable components and may be filled with fluid (liquid or gas) to provide insulation.

NOTE 1 For the use of this document high-voltage (IEC 60050-601:1985, 601-01-27) is the rated voltage above 1 000 V. However, medium voltage (IEC 60050-601:1985, 601-01-28) is commonly used for distribution systems with voltages above 1 kV and generally applied up to and including 52 kV; refer to [1] of Bibliography

NOTE 2 Although primarily dedicated to three-phase systems, this standard can also be applied to single-phase or two-phase systems.

This standard defines several categories of metal enclosed switchgear and controlgear which differ due to

– the consequences on network service continuity in case of maintenance on the switchgear and controlgear;
– the need and convenience of maintenance of the equipment.

NOTE 3 Safety of an installation results from the design, implementation and coordination of products, installations and operations.

For metal-enclosed switchgear and controlgear containing gas-filled compartments, the design pressure is limited to a maximum of 300 kPa (relative pressure).

NOTE 4 Gas-filled compartments having a design pressure exceeding 300 kPa (relative pressure) should be designed and tested in accordance with IEC 62271-203; refer to [6] of Bibliography.

Metal-enclosed switchgear and controlgear for special use, for example, in flammable atmospheres, in mines or on board ships, may be subject to additional requirements.

Components contained in metal-enclosed switchgear and controlgear are to be designed and tested in accordance with their various relevant standards. This standard supplements the standards for the individual components regarding their installation in switchgear and controlgear assemblies.

This standard does not preclude that other equipment may be included in the same enclosure. In such a case, any possible influence of that equipment on the switchgear and controlgear is to be taken into account.

NOTE 5 Switchgear and controlgear assemblies having an insulation enclosure are covered by IEC 62271-201.

NOTE 6 Metal-enclosed switchgear and controlgear for rated voltages above 52 kV insulated by ambient air may be covered by this standard taking into account the insulation levels of IEC 62271-1.

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 60050-151, *International Electrotechnical Vocabulary – Part 151: Electrical and magnetic devices*

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

IEC 60060-1, *High-voltage test techniques – Part 1: General definitions and test requirements*

IEC 60270, *High-voltage test techniques – Partial discharge measurements*

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

IEC 60529:1989, *Degrees of protection provided by enclosures (IP Code)*

IEC 62262, *Degrees of protection provided by enclosures for electrical equipment against external mechanical impacts (IK code)*

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

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

IEC 62271-102:2001, *High-voltage switchgear and controlgear – Part 102: Alternating current disconnectors and earthing switches*

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

IEC 62271-105, *High-voltage switchgear and controlgear – Part 105: Alternating current switch-fuse combinations*

IEC 62271-201:2006, *High-voltage switchgear and controlgear – Part 201: AC insulation-enclosed switchgear and controlgear for rated voltages above 1 kV and up to and including 52 kV*

IEC/TS 62271-304, *High-voltage switchgear and controlgear – Part 304: Design classes for indoor enclosed switchgear and controlgear for rated voltages above 1 kV up to and including 52 kV to be used in severe climatic conditions*

ISO/IEC Guide 51:1999, *Safety aspects – Guidelines for their inclusion in standards*

2 Normal and special service conditions

Clause 2 of IEC 62271-1 is applicable with the following addition:

Unless otherwise specified in this standard, the metal-enclosed switchgear and controlgear is designed to be used under normal service conditions.

Metal-enclosed switchgear and controlgear, under the scope of IEC/TS 62271-304 and intended to be used in service conditions more severe with respect to condensation and pollution than the normal service conditions specified in this standard, may be classified with a "design class" 1 or 2 according to IEC/TS 62271-304 to demonstrate its ability to withstand such severe conditions.

3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 60050-151, IEC 60050-441 and IEC 62271-1 as well as the following apply.

NOTE Additional definitions are classified so as to be aligned with the classification system used in IEC 60050-441.

3.101
switchgear and controlgear
general term covering switching devices and their combination with associated control, measuring, protective and regulating equipment, also assemblies of such devices and equipment with associated interconnections, accessories, enclosures and supporting structures

[IEC 60050-441:1984, 441-11-01]

3.102
metal-enclosed switchgear and controlgear
switchgear and controlgear assemblies with an external metal enclosure intended to be earthed and completely assembled, except for external connections

[IEC 60050-441:1984, 441-12-04, modified]

3.103
functional unit

part of metal-enclosed switchgear and controlgear comprising all the components of the main circuits and auxiliary circuits that contribute to the fulfilment of a single function

[IEC 60050-441:1984, 441-13-04, modified]

NOTE Functional units may be distinguished according to the function for which they are intended, for example, incoming unit, outgoing unit, etc.

3.104
multi-tier design
design of metal-enclosed switchgear in which the main switching devices of two or more functional units are arranged vertically (one above the other) within a common enclosure

3.105
transport unit
part of metal-enclosed switchgear and controlgear, prefabricated, and suitable for shipment without being dismantled

3.106
enclosure
part of metal-enclosed switchgear and controlgear providing a specified degree of protection of equipment against external influences and a specified degree of protection against approach to or contact with live parts and against contact with moving parts

[IEC 60050-441:1984, 441-13-01 modified]

3.107
high-voltage compartment
compartment of metal-enclosed switchgear and controlgear containing high-voltage conducting parts, enclosed except for openings necessary for interconnection, control or ventilation. Four types of high-voltage compartments are distinguished, three that can be opened, called accessible (see 3.107.1 to 3.107.3) and one that cannot be opened, called non-accessible (see 3.107.4)

NOTE 1 General definition of "compartment" is provided by IEC 60050-441:1984, 441-13-05, as "a part of an assembly enclosed except for openings necessary for interconnection, control or ventilation".

NOTE 2 A compartment may contain barriers, structures or components that are intended to provide various functions, such as mechanical or dielectrical, but not to function as a partition or enclosure.

NOTE 3 High-voltage compartments are identified according to the main component(s) contained therein or to the main function provided (refer to 5.103.1).

3.107.1
interlock-controlled accessible compartment
high-voltage compartment, intended to be opened for normal operation and/or normal maintenance as stated by the manufacturer, in which access is controlled by integral design of the switchgear and controlgear

NOTE Installation, extension, repair, etc. are not considered as normal maintenance.

3.107.2
procedure-based accessible compartment
high-voltage compartment, intended to be opened for normal operation and/or normal maintenance as stated by the manufacturer, in which access is controlled by a suitable procedure combined with locking

NOTE Installation, extension, repair, etc. are not considered as normal maintenance.

3.107.3
tool-based accessible compartment
high-voltage compartment, that may be opened only through the use of tools, but not intended for opening during normal operation and maintenance

NOTE Special procedures are required.

3.107.4
non-accessible compartment
high-voltage compartment that must not be opened

NOTE Opening may destroy the integrity of the compartment.

3.107.5
connection compartment
high-voltage compartment in which electrical connections are made between the main circuit of the switchgear assembly and the external conductors (cables or bars) to the electrical network or high-voltage apparatus of the installation

3.108
partition
part of metal-enclosed switchgear and controlgear separating one high-voltage compartment from other compartments and providing a specified degree of protection

[IEC 60050-441:1984, 441-13-06, modified]

NOTE 1 Movable shutters intended for shielding may become an integral part of the partition.

NOTE 2 Partitions may be fitted with parts that allow interconnection between compartments (e.g. bushings).

3.109
partition class
class defining whether metallic or non-metallic material is used for partitions

3.109.1
partition class PM
metal-enclosed switchgear and controlgear providing continuous metallic partitions and/or shutters (if applicable), intended to be earthed, between opened accessible compartments and high-voltage live parts

3.109.2
partition class PI
metal-enclosed switchgear and controlgear having one or more non-metallic partitions or shutters between opened accessible compartments and high-voltage live parts

3.110
shutter
part of metal-enclosed switchgear and controlgear that can be moved from a position where it permits contacts of a removable part, or moving contact of a disconnector, to engage fixed contacts, to a position where it becomes a part of the enclosure or partition shielding the fixed contacts

[IEC 60050-441:1984, 441-13-07, modified]

3.111
segregation (of conductors)
arrangement of conductors with earthed metal interposed between them in such a manner that disruptive discharges can only occur to earth

[IEC 60050-441:1984, 441-11-11]

NOTE 1 A segregation may be established between the conductors as well as between the open contacts of a switching device or disconnector.

NOTE 2 This definition does not specify any mechanical protection (IP and IK).

3.112
bushing
structure carrying one or more conductors through an enclosure or partition and insulating it there from, including the means of attachment

3.113
component
essential part of the high-voltage or earthing circuits of metal-enclosed switchgear and controlgear which serves a specific function (for example, circuit-breaker, disconnector, switch, fuse, instrument transformer, bushing, busbar)

3.114
main circuit
all the high-voltage conductive parts of metal-enclosed switchgear and controlgear included in a circuit which is intended to carry the rated normal current

[IEC 60050-441:1984, 441-13-02, modified]

3.115
earthing circuit
conductors, connections, and the conducting parts of earthing devices intended to connect the high-voltage conductive parts to the earthing system of the installation

NOTE Parts of metallic enclosures connected to the earthing system may be considered as part of the earthing circuit, refer to 5.3

3.116
auxiliary circuit
all the conductive parts of metal-enclosed switchgear and controlgear included in a circuit (other than the high-voltage parts) intended to control, measure, signal and regulate

[IEC 60050-441:1984, 441-13-03, modified]

NOTE The auxiliary circuits of metal-enclosed switchgear and controlgear include the control and auxiliary circuits of the switching devices.

3.117
pressure relief device
device intended to relieve over pressure from a compartment

3.118
fluid-filled compartment
high-voltage compartment of metal-enclosed switchgear and controlgear filled with a fluid, either gas, other than ambient air, or liquid, for insulation purposes

3.118.1
gas-filled compartment
refer to subclause 3.6.6.1 of IEC 62271-1

3.118.2
liquid-filled compartment
high-voltage compartment of metal-enclosed switchgear and controlgear in which the liquid is at atmospheric pressure, or under pressure that is maintained by one of the following systems:

a) controlled pressure system;
b) closed pressure system;
c) sealed pressure system

NOTE For pressure systems, refer to subclause 3.6.5 of IEC 62271-1.

3.119
relative pressure
pressure, referred to the standard atmospheric pressure of 101,3 kPa

3.120
minimum functional level (of fluid-filled compartments)
gas pressure (relative pressure) in Pa (or density) or liquid mass at and above which the rated values of the metal-enclosed switchgear and controlgear are maintained

3.121
design level (of fluid-filled compartments)
gas pressure (relative pressure) in Pa (or density) or liquid mass used to determine the design of a gas-filled compartment or mass for a liquid-filled compartment

3.122
design temperature (of fluid-filled compartments)
highest temperature which can be reached by the gas or liquid under service conditions

3.123
ambient air temperature (of metal-enclosed switchgear and controlgear)
temperature, determined under prescribed conditions, of the air surrounding the enclosure of metal-enclosed switchgear and controlgear

3.124
removable part
part of metal-enclosed switchgear and controlgear connected to the main circuit and that may be removed entirely from the metal-enclosed switchgear and controlgear and replaced, even though the main circuit of the functional unit is live

[IEC 60050-441:1984, 441-13-08, modified]

3.125
withdrawable part
removable part of metal-enclosed switchgear and controlgear that can be moved to positions in which an isolating distance or segregation between open contacts is established, while the part remains mechanically attached to the enclosure

[IEC 60050-441:1984, 441-13-09, modified]

3.126
service position
connected position
position of a removable part in which it is fully connected for its intended function

[IEC 60050-441:1984, 441-16-25]

3.127
earthing position
position of a removable part or state of a disconnector in which the closing of a mechanical switching device causes a main circuit to be short-circuited and earthed

[IEC 60050-441:1984, 441-16-26, modified]

3.128
test position (of a withdrawable part)
position of a withdrawable part in which an isolating distance or segregation is established in the main circuit and in which the auxiliary circuits are connected

[IEC 60050-441:1984, 441-16-27]

3.129
disconnected position (of a withdrawable part)
position of a withdrawable part in which an isolating distance or segregation is established in the circuits of the withdrawable part, that part remaining mechanically attached to the enclosure

[IEC 60050-441:1984, 441-16-28, modified]

NOTE In high-voltage metal-enclosed switchgear and controlgear, the auxiliary circuits may not be disconnected.

3.130
removed position (of a removable part)
position of a removable part when it is outside and mechanically and electrically separated from the enclosure

[IEC 60050-441:1984, 441-16-29, modified]

3.131
loss of service continuity category
LSC
category defining the possibility to keep other high-voltage compartments and/or functional units energised when opening an accessible high-voltage compartment, as stated in definitions 3.107.1 to 3.107.3.