

INTERNATIONAL STANDARD

IEC 62271-203

First edition
2003-11

High-voltage switchgear and controlgear – Part 203: Gas-insulated metal-enclosed switchgear for rated voltages above 52 kV

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

HIGH-VOLTAGE SWITCHGEAR AND CONTROLGEAR –

**Part 203: Gas-insulated metal-enclosed switchgear
for rated voltages above 52 kV**

FOREWORD

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International Standard IEC 62271-203 has been prepared by subcommittee 17C: High-voltage switchgear and controlgear assemblies, of IEC technical committee 17: Switchgear and controlgear.

This first edition of IEC 62271-203 cancels and replaces the third edition of IEC 60517, published in 1990, and constitutes a technical revision.

With the revision, significant changes from the previous edition have been made. The most important changes are deleting not used technologies, like 3-phase PD measurements, adopting the content to IEC 62271-1 'Common Clauses' and harmonisation with IEEE C37.122. This standard is now more up to date to today's products on the world market.

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

FDIS	Report on voting
17C/312/FDIS	17C/316/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 60694, second edition, published in 1996, its Amendment 1 (2000) and its Amendment 2 (2001), 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 60694. Amendments to these clauses and subclauses are given under the same numbering, whilst additional subclauses, are numbered from 101.

The committee has decided that the contents of this publication will remain unchanged until 2010. At this date, the publication will be

- reconfirmed;
- withdrawn;
- replaced by a revised edition, or
- amended.

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**COMMON NUMBERING OF IEC 62271 PUBLICATIONS FALLING UNDER
THE RESPONSIBILITY OF SUBCOMMITTEES SC 17A AND SC 17C**

In accordance with the decision taken at the joint SC 17A/SC 17C meeting in Frankfurt, June 1998 (item 20.7 of 17A/535/RM), a common numbering system has been established for the publications falling under the responsibility of SC 17A and SC 17C. IEC 62271 – *High-voltage switchgear and controlgear* is the publication number and main title element for the common publications.

The numbering of these publications will apply the following principle.

- a) Common standards prepared by SC 17A and SC 17C will start with IEC 62271-1.
- b) Standards of SC 17A will start with IEC 62271-100.
- c) Standards of SC 17C will start with number IEC 62271-200.
- d) Publications prepared by SC 17A and SC 17C will start with number IEC 62271-300.

The table below relates the new numbers to the old numbers. The parts numbered (xxx) will be given a final number pending the decision to publish the revised publication as standard or technical report.

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**Common numbering of IEC 62271 publications falling under the responsibility
of subcommittees SC 17A and SC 17C**

IEC 62271 series	HIGH-VOLTAGE SWITCHGEAR AND CONTROLGEAR	Old IEC number, if any
Part	New title	
1	Common specifications	IEC 60694
2	Seismic qualification for rated voltages of 72,5 kV and above	-
100	High-voltage alternating current circuit-breakers	IEC 60056
101	Synthetic testing	IEC 60427
102	High-voltage alternating current disconnectors and earthing switches	IEC 60129
103	Switches for rated voltages above 1 kV and less than 52 kV	IEC 60265-1
104	Switches for rated voltages of 52 kV and above	IEC 60265-2
105	Alternating current switch-fuse combinations	IEC 60420
106	Alternating current contactors and contactor-based motor-starters	IEC 60470
107	Alternating current switchgear-fuse combinations	-
108	Switchgear having combined functions	-
109	Series capacitor by-pass switches	-
200	AC metal-enclosed switchgear and controlgear for rated voltages above 1 kV and up to and including 52 kV	IEC 60298
201	Insulation-enclosed switchgear and controlgear for rated voltages up to and including 52 kV	IEC 60466
202	High-voltage/low-voltage prefabricated substations	IEC 61330
203	Gas-insulated metal-enclosed switchgear for rated voltages above 52 kV	IEC 60517
204	High-voltage gas-insulated transmission lines for rated voltages of 72,5 kV and above	IEC 61640
(300)	Guide for seismic qualification of high-voltage alternating current circuit-breakers	IEC 61166
(301)	Guide for inductive load switching	IEC 61233
(302)	Guide for short-circuit and switching test procedures for metal-enclosed and dead tank circuit-breakers	IEC 61633
(303)	Use and handling of sulphur hexafluoride (SF ₆) in high-voltage switchgear and controlgear	IEC 61634
(304)	Additional requirements for enclosed switchgear and controlgear from 1 kV to 72,5 kV to be used in severe climatic conditions	IEC 60932
(305)	Cable connections for gas-insulated metal-enclosed switchgear for rated voltages above 52 kV	IEC 60859
(306)	Direct connection between power transformers and gas-insulated metal-enclosed switchgear for rated voltages above 52 kV	IEC 61639
(307)	Use of electronic and associated technologies in auxiliary equipment of switchgear and controlgear	IEC 62063
308	Guide for asymmetrical short-circuit breaking test duty T100a	-
309	TRV parameters for high-voltage switchgear and controlgear for rated voltages above 1 kV and less than 100 kV	-
310	Electrical endurance testing for circuit-breakers rated 72,5 kV and above	-

HIGH-VOLTAGE SWITCHGEAR AND CONTROLGEAR –

Part 203: Gas-insulated metal-enclosed switchgear for rated voltages above 52 kV

1 General

1.1 Scope

This standard specifies requirements for gas-insulated, metal-enclosed switchgear in which the insulation is obtained, at least partly, by an insulating gas other than air at atmospheric pressure, for alternating current of rated voltages above 52 kV, for indoor and outdoor installation, and for service frequencies up to and including 60 Hz.

For the purpose of this standard, the terms “GIS” and “switchgear” are used for “gas-insulated metal-enclosed switchgear”.

The gas-insulated metal-enclosed switchgear covered by this standard consists of individual components intended to be directly connected together and able to operate only in this manner.

This standard completes and amends, if necessary, the various relevant standards applying to the individual components constituting GIS.

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.

Subclause 1.2 of IEC 60694 is applicable with the following additions:

IEC 60044-1, *Instrument transformers – Part 1: Current transformers*

IEC 60044-2, *Instrument transformers – Part 2: Inductive voltage transformers*

IEC 60068-2-11, *Environmental testing – Part 2: Tests. Test Ka: Salt mist*

IEC 60137, *Insulating bushings for alternating voltages above 1 000 V*

IEC 60141-1, *Tests on oil-filled and gas-pressure cables and their accessories – Part 1: Oil-filled, paper or polypropylene paper laminate insulated, metal-sheathed cables and accessories for alternating voltages up to and including 500 kV*

IEC 60840, *Power cables with extruded insulation and their accessories for rated voltages above 30 kV ($U_m = 36$ kV) up to 150 kV ($U_m = 170$ kV) – Test methods and requirements*

IEC 60859, *Cable connections for gas-insulated metal-enclosed switchgear for rated voltages of 72,5 kV and above – Fluid-filled and extruded insulation cables – Fluid-filled and dry type cable-terminations*

IEC 61462, *Composite insulators – Hollow insulators for use in outdoor and indoor electrical equipment – Definitions, test methods, acceptance criteria and design recommendations*

IEC 61639, *Direct connection between power transformers and gas-insulated metal-enclosed switchgear for rated voltages of 72,5 kV and above*

IEC 61672-1, *Electroacoustics – Sound level meters – Part 1: Specifications*

IEC 61672-2, *Electroacoustics – Sound level meters – Part 2: Pattern evaluation tests*

IEC 62067, *Power cables with extruded insulation and their accessories for rated voltages above 150 kV ($U_m = 170$ kV) up to 500 kV ($U_m = 550$ kV) – Test methods and requirements*

IEC 62155, *Hollow pressurized and unpressurized ceramic and glass insulators for use in electrical equipment with rated voltages greater than 1 000 V*

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

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

ISO 3231, *Paints and varnishes – Determination of resistance to humid atmospheres containing sulfur dioxide*

NOTE Other standards are referred to for information in this standard. They are listed in the Bibliography.

2 Normal and special service conditions

Clause 2 of IEC 60694 is applicable with the following additions:

At any altitude the dielectric characteristics of the internal insulation are identical with those measured at sea-level. For this internal insulation, therefore, no specific requirements concerning the altitude are applicable.

Some items of a GIS such as pressure relief devices and pressure and density monitoring devices may be affected by altitude. The manufacturer shall take appropriate measures if necessary.

2.1 Normal service conditions

Subclause 2.1 of IEC 60694 is applicable, taking into the account Table 101 of this standard.

2.2 Special service conditions

Subclause 2.2 of IEC 60694 is applicable, taking into account Table 101 of this standard.

In case where higher than (>) is used in the table the value shall be specified by the user as described in IEC 60694.

Table 101 – Reference table of service conditions relevant to GIS

Item	Normal		Special	
	Indoor	Outdoor	Indoor	Outdoor
Ambient air temperature:				
Minimum (°C)	–5 or –25	–25 or –40	–25	–50
Maximum (°C)	+40	+40	+50	+50
Solar radiation (W/m ²)	Not applicable	1 000	Not applicable	>1 000
Altitude (m)	1 000	1 000	>1 000	>1 000
Pollution class ^a	Not applicable	II	II, III or IV	III or IV
Ice coating (mm)	Not applicable	1, 10 or 20	Not applicable	>20
Wind (m/s)	Not applicable	34	Not applicable	>34
Humidity (%)	95	100	98	100
Condensation or precipitation	Occasional	Yes	Yes	Yes
Vibration class	Not applicable	Not applicable	IEC 61166	IEC 61166
Induced electromagnetic disturbances in secondary system (kV)	1,6	1,6	>1,6	>1,6
NOTE The user's specification may use any combination of normal or special service conditions above.				
^a Pollution class II, III and IV according to Table 1 of IEC 60815.				

3 Terms and definitions

For the purposes of this document, the definitions given in IEC 60694, together with the following definitions, apply.

3.101

metal-enclosed switchgear and controlgear

switchgear and controlgear assemblies with an external metal enclosure intended to be earthed, and complete except for external connections

[IEV 441-12-04]

3.102

gas-insulated metal-enclosed switchgear

metal-enclosed switchgear in which the insulation is obtained, at least partly, by an insulating gas other than air at atmospheric pressure

NOTE 1 This term generally applies to high-voltage switchgear and controlgear.

[IEV 441-12-05]

NOTE 2 Three-phase enclosed gas-insulated switchgear applies to switchgear with the three phases enclosed in a common enclosure.

NOTE 3 Single-phase enclosed gas-insulated switchgear applies to switchgear with each phase enclosed in a single independent enclosure.

3.103**gas-insulated switchgear enclosure**

part of gas-insulated metal-enclosed switchgear retaining the insulating gas under the prescribed conditions necessary to maintain safely the highest insulation level, protecting the equipment against external influences and providing a high degree of protection to personnel

NOTE The enclosure can be single-phase or three-phase.

3.104**removable link**

part of the conductor which can easily be removed in order to isolate two parts of the GIS from each other

3.105**compartment**

part of gas-insulated metal-enclosed switchgear, totally enclosed except for openings necessary for interconnection and control

NOTE A compartment may be designated by the main component contained therein, e.g. circuit-breaker compartment, busbar compartment.

3.106**component**

essential part of the main or earthing circuits of gas-insulated metal-enclosed switchgear which serves a specific function (for example circuit-breaker, disconnecter, switch, fuse, instrument transformer, bushing, busbar, etc.)

3.107**support insulator**

internal insulator supporting one or more conductors

3.108**partition**

support insulator of gas-insulated metal-enclosed switchgear separating one compartment from other compartments

3.109**bushing**

structure carrying one or more conductors at the terminal of the enclosure and insulating it therefrom, including the means of attachment (e.g. air bushings)

3.110**main circuit**

all the conductive parts of gas-insulated metal-enclosed switchgear included in a circuit which is intended to transmit electrical energy

[IEV 441-13-02, modified]

3.111**auxiliary circuit**

all the conductive parts of gas-insulated metal-enclosed switchgear included in a circuit (other than the main circuit) intended to control, measure, signal and regulate

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