IEC 62271-200

Edition 3.0 2024-06

INTERNATIONAL STANDARD

NORME INTERNATIONALE

AMENDMENT 1
AMENDEMENT 1

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 62271-200:2021-05/AMD1:2024-06(en-fr)

IEC Secretariat
3, rue de Varembé
CH-1211 Geneva 20
Switzerland

Tel.: +41 22 919 02 11
info@iec.ch
www.iec.ch

About the IEC
The International Electrotechnical Commission (IEC) is the leading global organization that prepares and publishes International Standards for all electrical, electronic and related technologies.

About IEC publications
The technical content of IEC publications is kept under constant review by the IEC. Please make sure that you have the latest edition, a corrigendum or an amendment might have been published.

IEC publications search - webstore.iec.ch/advsearchform
The advanced search enables to find IEC publications by a variety of criteria (reference number, text, technical committee, …). It also gives information on projects, replaced and withdrawn publications.

IEC Just Published - webstore.iec.ch/justpublished
Stay up to date on all new IEC publications. Just Published details all new publications released. Available online and once a month by email.

IEC Customer Service Centre - webstore.iec.ch/csc
If you wish to give us your feedback on this publication or need further assistance, please contact the Customer Service Centre: sales@iec.ch.

IEC Products & Services Portal - products.iec.ch
Discover our powerful search engine and read freely all the publications previews, graphical symbols and the glossary. With a subscription you will always have access to up to date content tailored to your needs.

Electropedia - www.electropedia.org
The world's leading online dictionary on electrotechnology, containing more than 22 500 terminological entries in English and French, with equivalent terms in 25 additional languages. Also known as the International Electrotechnical Vocabulary (IEV) online.

A propos de l'IEC
La Commission Electrotechnique Internationale (IEC) est la première organisation mondiale qui élabore et publie des Normes internationales pour tout ce qui a trait à l'électricité, à l'électronique et aux technologies apparentées.

A propos des publications IEC
Le contenu technique des publications IEC est constamment revu. Veuillez vous assurer que vous possédez l'édition la plus récente, un corrigendum ou amendement peut avoir été publié.

Recherche de publications IEC - webstore.iec.ch/advsearchform
La recherche avancée permet de trouver des publications IEC en utilisant différents critères (numéro de référence, texte, comité d'études, …). Elle donne aussi des informations sur les projets et les publications remplacées ou retirées.

IEC Just Published - webstore.iec.ch/justpublished
Restez informé sur les nouvelles publications IEC. Just Published détaille les nouvelles publications parues. Disponible en ligne et une fois par mois par email.

Service Clients - webstore.iec.ch/csc
Si vous désirez nous donner des commentaires sur cette publication ou si vous avez des questions contactez-nous: sales@iec.ch.

IEC Products & Services Portal - products.iec.ch
Découvrez notre puissant moteur de recherche et consultez gratuitement tous les aperçus des publications, symboles graphiques et le glossaire. Avec un abonnement, vous aurez toujours accès à un contenu à jour adapté à vos besoins.

Electropedia - www.electropedia.org
Le premier dictionnaire d'électrotechnologie en ligne au monde, avec plus de 22 500 articles terminologiques en anglais et en français, ainsi que les termes équivalents dans 25 langues additionnelles. Egalement appelé Vocabulaire Electrotechnique International (IEV) en ligne.

IEC 62271-200

Edition 3.0 2024-06

INTERNATIONAL STANDARD

NORME INTERNATIONALE

AMENDMENT 1
AMENDEMENT 1

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

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

COMMISSION
ELECTROTECHNIQUE
INTERNATIONALE

ICS 29.130.10

ISBN 978-2-8322-9058-3

INTERNATIONAL ELECTROTECHNICAL COMMISSION

____

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

AMENDMENT 1

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.
3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
6) All users should ensure that they have the latest edition of this publication.
7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
9) IEC draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). IEC takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, IEC had not received notice of (a) patent(s), which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at https://patents.iec.ch. IEC shall not be held responsible for identifying any or all such patent rights.

Amendment 1 to IEC 62271-200:2021 has been prepared by subcommittee 17C: Assemblies, of IEC technical committee 17: High-voltage switchgear and controlgear.

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

Draft	Report on voting
17C/933/FDIS	17C/938/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 Amendment 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/publications/.

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, or
- revised.

_____

INTRODUCTION

Add, at the end of the existing text, the following new paragraph:

Generally, gas-filled medium-voltage designs have design pressures below 500 kPa, as mentioned for example in the introduction of EN 50187.

2 Normative references

Delete the existing reference to IEC 62271-203:2011.

Add the following normative reference:

ISO 4126-2, *Safety devices for protection against excessive pressure – Part 2: Bursting disc safety devices*

3 Terms and definitions

Replace the existing 3.6.101 term, definition and notes to entry with the following:

3.6.101
loss of service continuity category
LSC
<of a functional unit> category defining the possibility to keep other high-voltage compartments and/or functional units energized when opening its connection compartment or any other of its high-voltage compartment(s) accessible in normal use, as stated in definitions 3.5.110 and 3.5.111, giving access to at least part of the high-voltage circuit contained within

Note 1 to entry: The LSC category describes the extent to which the assembly is intended to remain operational where access to a high-voltage compartment is provided. The extent to which it is considered necessary to open high-voltage compartments of an installation in service might be dependent on several aspects (refer to 9.101).

Note 2 to entry: The LSC category does not describe or relate to different levels of reliability of assemblies (refer to 9.101).

Note 3 to entry: In relation to providing access to high-voltage compartments and the associated service continuity, four categories are defined: LSC1, LSC2, LSC2A, LSC2B (refer to Annex D).

6 Design and construction

6.10 Pressure/level indication

Replace the existing sentence of this subclause with the following new text:

Subclause 6.10 of IEC 62271-1:2017 is applicable with the following addition to 6.10.1 of IEC 62271-1:2017.

For gas-filled compartments where the minimum functional pressure exceeds 200 kPa (absolute pressure at 20 °C) an indication shall be provided when the absolute pressure at 20 °C has fallen below the minimum functional level (refer to 3.6.114).

NOTE 1 The indication might include monitoring of pressure (density).

Closed pressure systems with minimum functional pressure above 200 kPa (absolute pressure) shall have a defined alarm pressure (density) level.

NOTE 2 Alarm pressure (density) is defined in IEC 62271-1:2017, 3.6.5.3 and 3.6.5.4.

An example of pressure coordination chart is shown in Figure E.1.

6.102.2 Covers and doors

Replace the existing item b) with the following new item:

b) Covers and doors that give access to interlock-controlled accessible or procedure-based accessible compartments

These covers and doors shall be provided if there is a need to access the compartment for normal use as stated by the manufacturer. These covers and doors shall not require tools for their opening or removal. It is permissible that the manipulation of some fixing elements for their opening or removal is required, and they shall have the following features:

– interlock controlled accessible compartments shall be provided with interlocking devices so that opening of the compartment shall only be possible when the high-voltage parts contained in the compartment being made accessible are isolated and earthed, or are in the disconnected position with corresponding shutters closed;

– procedure-based accessible compartments shall be provided with provision for locking, e.g. padlocking. Suitable procedures should be put in place by the user to ensure that a procedure-based accessible compartment is opened only when the high-voltage parts contained in the compartment being made accessible are isolated and earthed, or in the disconnected position with corresponding shutters closed. Procedures can be dictated by the legislation of the country of installation or by the user safety documentation.

NOTE Examples of fixing elements are screws, bolts, nuts, turning fasteners and sliding fasteners.

If interlock-controlled or procedure-based accessible compartments have covers that can be opened by tools, other than those that are interlocked or locked, proper procedures or specific warning labels should be applied.

Access to a closed interlock-controlled or procedure-based compartment through covers needing only the use of tools to be opened or removed is not intended for normal use. Once an interlocked or locked door or cover of an accessible compartment is opened or removed for normal use, it is permissible that the opening or removing of other covers of the same accessible compartment requires the use of tools.

6.103.1 General

Replace the existing NOTE 1 with the following new note:

NOTE 1 Only interlock-controlled accessible compartments and procedure based accessible compartments are considered when defining the LSC category of a functional unit.

Replace the existing fifth paragraph after NOTE 1 with the following new paragraph:

The LSC category can only be assigned to functional units that include a connection compartment. This implies that e.g. a bus-sectionaliser or bus-coupler functional unit will have no LSC category, refer to Figure 8 and Figure 9.

6.103.2.1 General

*Replace, in the existing second sentence of the second paragraph, "*are normally filled*" with "*are filled*".*

Add, after the existing second paragraph, the following new NOTE 1:

NOTE 1 The non-corrosive conditions that prevail inside gas-filled compartments are maintained by appropriate measures such as filter material to adsorb humidity and decomposition products, if any.

Replace the existing last paragraph of this subclause with the following new paragraph:

Materials used in the construction of enclosures should be of known and certified minimum physical properties on which pressure tests are based (see 7.103). The manufacturer is responsible for the selection of the materials and the maintenance of these minimum properties, based on certification of the material supplier or tests conducted by the manufacturer, or both.

Renumber the existing NOTE as NOTE 2.

6.103.2.2 Design

Replace the existing first paragraph of this subclause with the following new paragraph:

The design of a fluid filled compartment shall be based on the nature of the fluid, the design temperature and the design pressure as defined in this document.

Replace the existing third and fourth paragraphs of this subclause with the following new text:

The design pressure of a compartment is equal to the maximum pressure difference between the fluid inside the compartment at design temperature that the fluid used for insulation can reach under specified maximum service conditions, and the surrounding media, like ambient air or insulation fluids in other compartments. Therefore, the design pressure calculation shall also consider:

a) the full differential pressure possible across the compartment walls or partitions, including any evacuation process if used during filling or maintenance operations;
b) the resulting pressure in the event of an accidental leak between the compartments in the case of adjacent compartments having different service pressures.

Add, after the last existing paragraph of this subclause, the following new text:

The design of the fluid-filled compartment shall also take into account the possibility of the occurrence of an internal arc fault.

In normal service, the pressure inside a gas-filled compartment varies from the filling pressure p_{re} with the gas temperature variations, at different service conditions, and possible leaks. Several pressure values shall be coordinated when designing a fluid-filled compartment. An example is shown in Figure E.1.

6.103.2.3 Tightness

Delete the existing third paragraph of this subclause (now moved to 6.10).

6.103.2.4 Pressure relief of fluid-filled compartments

Replace the existing second sentence of this subclause with the following new sentence:

Pressure relief devices shall operate with relative pressure above 1,3 times the design pressure.

7 Type tests

7.102.2 Mechanical and electromechanical interlocks and locking devices

Replace the existing sentence below the 5 dashed items of the fourth paragraph with the following new text:

The force shall be applied at the midpoint of the gripping part of the handle or actuator with the following considerations:

– For handles consisting of one or more levers, the gripping part shall be defined by the manufacturer before testing. In this case, two different scenarios are considered:
  - if intended for gripping with one hand, the gripping part shall not extend more than 100 mm from the end of the lever;
  - if intended for gripping with two hands next to each other, the gripping part shall not extend more than 200 mm from the end of the lever.
– For handles where the lever is extensible or sliding, the lever shall be at the longest possible length, and the full force shall be applied to only one of the gripping parts of the lever(s), if more than one exists.

7.103.1 Pressure withstand test for gas-filled compartments with pressure relief devices

Replace the existing content of this subclause with the following new text:

Each design of a gas-filled compartment equipped with its pressure relief devices(s) shall be subjected to pressure tests as follows:

– Adjacent compartments (if any) shall be set at a pressure not higher than the minimum functional pressure of those compartments. If the manufacturer's instructions reference allow for maintenance of those compartments, they shall be at atmospheric pressure. Alternatively, they even may be evacuated, if allowed by the manufacturer.

  NOTE 1 This test configuration covers the over-pressure behaviour under intended service conditions.

  NOTE 2 The design pressure (relative pressure) calculation already considers the situation of adjacent compartment evacuated, if allowed by the manufacturer.

– The ambient temperature shall be between 15 °C and 30 °C.

  NOTE 3 The temperature range is in accordance with ISO 4126-2.

– For all the following pressure tests, the relative pressure shall be increased with a pressure rise not exceeding 400 kPa/min in order to reach a value of 1,3 times the design pressure of the compartment for a period of 1 min. The pressure relief device shall not operate and the compartment shall not show signs of distress or any distortion likely to affect the operation of the assembly.

– To determine the highest possible value at which the pressure relief device operates, two possible scenarios shall be considered:
  - if no certificate is available for the pressure relief device (for example, in case of integral pressure relief devices), the operating pressure of the pressure relief device shall be verified by testing 5 samples of the pressure relief on the specific compartment design;
  - if a certificate according to ISO 4126-2 for the pressure relief device is available for the range of service temperatures and up to the design temperature, it shall be verified that the operating pressure is in the range given by the certificate by a single test on the specific compartment design.
– For both scenarios, the relative pressure shall be increased with a pressure rise not exceeding 400 kPa/min up to the pressure relief device operates, as designed by the manufacturer.
  - The opening pressure(s) shall be recorded in the type test report.
  - A visual inspection of the orientation of the pressure relief device should be performed. The direction of escaping gases should be indicated in the test report.
– Then, a verification of the safety margin of the compartment with respect to the pressure relief operation shall be performed as follows:
  - the pressure relief device shall be blocked or reinforced without impacting the withstand pressure of the compartment;
  - then, the relative pressure shall be increased with a pressure rise not exceeding 400 kPa/min up to the highest value where the pressure relief would operate (by certificate or test mentioned above) multiplied by a safety factor. Two possible cases shall be considered:
    – if a certificate is available for the pressure relief device for the range of service temperatures and up to the design temperature, the applied safety factor to the upper value of operation given by the certificate shall be 1,1;
    – if no certificate is available for the pressure relief device (for example, in case of integral pressure relief devices), the highest opening pressure recorded in the 5 previous tests is taken and the applied safety factor shall be 1,5.
  - the test pressure level shall be maintained for 1 min;
  - the compartment may be distorted, but it shall not rupture during the test.

7.103.2 Pressure withstand test for gas-filled compartments without pressure-relief devices

Replace the existing title and text of this subclause with the following new title and text:

7.103.2 Pressure withstand test for gas-filled compartments without pressure relief devices

Each design of a gas-filled compartment without pressure relief device shall be subjected to a pressure test according to the following procedure:

– Adjacent compartments (if any) shall be set at a pressure not higher than the minimum functional pressure of those compartments. If the manufacturer's instructions reference allow for maintenance of those compartments, they shall be at atmospheric pressure. Alternatively, they even may be evacuated, if allowed by the manufacturer.

NOTE 1 This test configuration covers the over-pressure behaviour under intended service conditions.

NOTE 2 The design pressure (relative pressure) calculation already considers the situation of adjacent compartment evacuated, if allowed by the manufacturer.

– The ambient temperature shall be between 15 °C and 30 °C.

– The relative pressure shall be increased with a pressure rise not exceeding 400 kPa/min up to three times the design pressure of the compartment, except for those with cast aluminium walls with design pressure above 300 kPa where the upper value shall be five times the design pressure. The test pressure level shall be maintained for 1 min. After the test, the compartment may be distorted but it shall not rupture.

7.105.2 Test conditions

Replace the existing paragraph between NOTE 1 and NOTE 2 with the following text:

If, during the test, an arc ignites in another already arc-tested compartment of the same test object (see 7.105.3), the test is not valid. However, if during the test, an arc ignites in a non-previously arc-tested compartment(s) of the same test object, the test shall be regarded as valid for the compartment where the arc was initiated, under the condition that it can be proven that the ignition was the consequence of design construction, as declared by the manufacturer before the test. Examples of such design constructions are:

– a lower short-circuit withstand of part of the circuit, upstream in the current path from the compartment under test;

– burn-through, or opening of pressure relief flaps, to another compartment.

The manufacturer's declaration shall be referred to in the test report.

The other affected compartment(s) shall be (or shall have been) tested with the point of initiation as required in A.5.2.1. The number of phases to be tested shall be in accordance with A.5.2.1 and Table A.1 provided that the arc initiation involves at least the number of phases involved in this take-over ignition.

8 Routine tests

8.103 Pressure tests of gas-filled compartments

Replace the existing text of this subclause with the following new text:

Each gas-filled compartment with a filling pressure above 150 kPa (absolute pressure) shall withstand during 1 min:

– 2,0 times the design pressure for cast resin, ceramic or cast aluminium gas-filled compartments without pressure relief device;

– 1,3 times the design pressure in other cases.

After this test the compartment shall show no signs of distress or any distortion likely to affect the operation of the assembly.

9 Guide to the selection of switchgear and controlgear (informative)

9.101.2 Architecture and accessibility to high-voltage compartments

Replace the existing content of this subclause with the following new text:

The forms of internal partitioning defined in this document attempt to balance requirements as service continuity and maintainability. In this subclause, some guidance is given regarding the extent to which the different forms can provide maintainability.

NOTE 1 Temporary inserted partitions, to prevent accidental contact with live parts while performing certain maintenance procedures, are addressed in 11.5.

NOTE 2 Possible alternative maintenance procedures, e.g. the establishment of safety distances and/or setting up and use of temporary barriers, are outside the scope of this document.