

**High-voltage switchgear and controlgear - Part
4: Handling procedures for gases for insulation
and/or switching**

EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

See Eesti standard EVS-EN IEC 62271-4:2022 sisaldab Euroopa standardi EN IEC 62271-4:2022 ingliskeelset teksti.	This Estonian standard EVS-EN IEC 62271-4:2022 consists of the English text of the European standard EN IEC 62271-4:2022.
Standard on jõustunud sellekohase teate avaldamisega EVS Teatajas.	This standard has been endorsed with a notification published in the official bulletin of the Estonian Centre for Standardisation and Accreditation.
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English Version

High-voltage switchgear and controlgear - Part 4: Handling
procedures for gases for insulation and/or switching
(IEC 62271-4:2022)

Appareillage à haute tension - Partie 4: Procédures de
manipulation des gaz pour l'isolation et/ou la commutation
(IEC 62271-4:2022)

Hochspannungs-Schaltgeräte und -Schaltanlagen - Teil 4:
Handhabungsmethoden für Gase zur Isolation und/oder
Unterbrechung
(IEC 62271-4:2022)

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Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

European foreword

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The following dates are fixed:

- latest date by which the document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2023-05-26
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2025-08-26

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In the official version, for Bibliography, the following notes have to be added for the standards indicated:

IEC/IEEE 82079-1:2019 NOTE Harmonized as EN IEC/IEEE 82079-1:2020 (not modified)

IEC 62474:2018 NOTE Harmonized as EN IEC 62474:2019 (not modified)

Annex ZA (normative)

Normative references to international publications with their corresponding European publications

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.

NOTE 1 Where an International Publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

NOTE 2 Up-to-date information on the latest versions of the European Standards listed in this annex is available here: www.cenelec.eu.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 60050-212	2010	International Electrotechnical Vocabulary - Part 212: Electrical insulating solids, liquids and gases	-	-
+ AMD1	2015			
+ AMD2	2015		-	-
+ AMD3	2020		-	-
IEC 60050-426	2020	International Electrotechnical Vocabulary (IEV) - Part 426: Explosive atmospheres	-	-
IEC 60050-441	1984	International Electrotechnical Vocabulary. Switchgear, controlgear and fuses	-	-
+ AMD1	2000		-	-
IEC 60335-2-69	2021	Household and similar electrical appliances - Safety - Part 2-69: Particular requirements for wet and dry vacuum cleaners, including power brush, for commercial use	-	-
IEC 60376	2018	Specification of technical grade sulphur hexafluoride (SF ₆) and complementary gases to be used in its mixtures for use in electrical equipment	EN IEC 60376	2018
IEC 60480	2019	Specifications for the re-use of sulphur hexafluoride (SF ₆) and its mixtures in electrical equipment	EN IEC 60480	2019
IEC 62271-1	2017	High-voltage switchgear and controlgear - Part 1: Common specifications for alternating current switchgear and controlgear	EN 62271-1	2017
+ AMD1	2021		+ A1	2021
ISO 8573-1	2010	Compressed air - Part 1: Contaminants and purity classes	-	-

INTERNATIONAL STANDARD

NORME INTERNATIONALE



**High-voltage switchgear and controlgear –
Part 4: Handling procedures for gases for insulation and/or switching**

**Appareillage à haute tension –
Partie 4: Procédures de manipulation des gaz pour l'isolation et/ou la
commutation**



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

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

NORME INTERNATIONALE



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INTERNATIONAL ELECTROTECHNICAL COMMISSION

HIGH-VOLTAGE SWITCHGEAR AND CONTROLGEAR –

Part 4: Handling procedures for gases for insulation and/or switching

FOREWORD

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IEC 62271-4 has been prepared by IEC technical committee 17: High-voltage switchgear and controlgear. It is an International Standard.

This second edition cancels and replaces the first edition of IEC 62271-4 published in 2013. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

- a) title has been modified;
- b) handling procedures of alternatives to SF₆, which are used for insulation and/or switching, are added;
- c) the main clauses are independent from the type of gas;
- d) for each gas a separate annex describes gas specific information, handling procedures, safety measure, etc.;

- e) information about SF₆ (former Annex E) and about environmental effects of SF₆ and its mixtures (former Annex F) has been moved to IEC 60376;
- f) information about by-products of SF₆ and its mixtures (former Annex G), the procedure for evaluating the potential effects on health of by-products of SF₆ and its mixtures (former Annex H) and the cryogenic reclaim of SF₆ (former Annex I) have been moved to IEC 60480.

The text of this International Standard is based on the following documents:

Draft	Report on voting
17/1124/FDIS	17/1125/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.

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.

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.

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.

IMPORTANT – The "colour inside" logo on the cover page of this document 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.

INTRODUCTION

The International Electrotechnical Commission (IEC) draws attention to the fact that it is claimed that compliance with this document can involve the use of a patent. IEC takes no position concerning the evidence, validity, and scope of this patent right.

The holder of this patent right has assured IEC that s/he is willing to negotiate licences under reasonable and non-discriminatory terms and conditions with applicants throughout the world. In this respect, the statement of the holder of this patent right is registered with IEC. Information can be obtained from the patent database available at <http://patents.iec.ch>.

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This document does not purport to address all the safety problems associated with its use. It is the responsibility of the user of this document to establish appropriate health and safety practices and determine the applicability of regulatory limitations prior to use.

The gases for insulation and/or switching which are the subjects of this document should be handled in compliance with local regulations, suppliers safety data-sheets, the operating instruction manual of the manufacturer and the safety guidance of the user of the electric power equipment.

Considering the limited information for some of the data which appear in the informative Annex E and Annex F, the reader should be aware that the information related with possible by-products and their possible toxicological effects on health and on the environment is still a matter of study.

Within IEC TC 10 new standards about specifications of technical grade (IEC 63360) and re-use (IEC 63359) for alternatives to SF₆ are being prepared. Therefore, in a later revision of this standard, some of the information will be moved to these new standards, similarly as it has been done for SF₆ and SF₆ mixtures.

HIGH-VOLTAGE SWITCHGEAR AND CONTROLGEAR –

Part 4: Handling procedures for gases for insulation and/or switching

1 Scope

This part of IEC 62271 applies to the procedures for handling of gases for insulation and/or switching during installation, commissioning, repair, overhaul, normal and abnormal operations and disposal at the end-of-life of electric power equipment.

These procedures are regarded as minimum requirements to ensure the reliability of electric power equipment, the safety of personnel working with these gases and to minimize the impact on the environment. Additional requirements could be given or specified in the operating instruction manual of the manufacturer.

For each gas, which is known to be used in electric power equipment at the date of the publication of this document, a separate annex describes specifications, handling procedures, safety measures, etc. For gases not covered by these annexes the electric power equipment manufacturer should provide the information needed, following the structure of these annexes. Such gases should also be described in a next edition or in amendments to this edition.

NOTE 1 For the use of this document, high-voltage (HV) is defined as the rated voltage above 1 000 V. However, the term medium-voltage (MV) is commonly used for distribution systems with voltages above 1 kV and generally applied up to and including 52 kV.

NOTE 2 Throughout this document, the term “pressure” stands for “absolute pressure”.

NOTE 3 In this document, percentages of gaseous components, contaminants and by-products, are always percentages per volume, measured at 20 °C, if not otherwise indicated.

NOTE 4 Reference is also made to CIGRE Brochure 802 [1] ¹.

NOTE 5 For further details on gases, e.g. ecotoxicology, also refer to the chemical database of the European Chemicals Agency, ECHA (www.echa.europa.eu), which takes the actual tonnage band into consideration.

NOTE 6 If gases for insulation and/or switching are regulated, their designation and regulation origin can be found in the IEC 62474 database (available at <https://std.iec.ch/iec62474> [26]).

NOTE 7 When reference to circuit-breakers is made, only gas circuit-breakers are of interest. When vacuum circuit-breakers are of interest, they are explicitly mentioned.

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.

IEC 60050-212:2010, *International Electrotechnical Vocabulary (IEV) – Part 212: Electrical insulating solids, liquids and gases* (available at www.electropedia.org)

IEC 60050-212:2010/AMD1:2015

IEC 60050-212:2010/AMD2:2015

IEC 60050-212:2010/AMD3:2020

¹ Numbers in square brackets refer to the Bibliography.

IEC 60050-426:2020, *International Electrotechnical Vocabulary (IEV) – Part 426: Explosive atmospheres* (available at www.electropedia.org)

IEC 60050-441:1984, *International Electrotechnical Vocabulary (IEV) – Part 441: Switchgear, controlgear and fuses* (available at www.electropedia.org)
IEC 60050-441:1984/AMD1:2000

IEC 60335-2-69:2021, *Household and similar electrical appliances – Safety – Part 2-69: Particular requirements for wet and dry vacuum cleaners, including power brush, for commercial use*

IEC 60376:2018, *Specification of technical grade sulphur hexafluoride (SF₆) and complementary gases to be used in its mixtures for use in electrical equipment*

IEC 60480:2019, *Specifications for the re-use of sulphur hexafluoride (SF₆) and its mixtures in electrical equipment*

IEC 62271-1:2017, *High-voltage switchgear and controlgear – Part 1: Common specifications for alternating current switchgear and controlgear*
IEC 62271-1:2017/AMD1:2021

ISO 8573-1:2010, *Compressed air – Part 1: Contaminants and purity classes*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 60050-212 and IEC 60050-441, as well as 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>

3.1 General terms and definitions

3.1.1

electric power equipment

any high-voltage or medium-voltage equipment containing gas for insulation and/or switching, e.g. switchgear and controlgear, gas-insulated lines, transformers, instrument transformers, etc.

3.1.2

gas

pure gas or gas mixture used for insulation and/or switching within electric power equipment

Note 1 to entry: A gas might contain contaminants.

3.1.3

pure gas

gas made up of identical atoms or molecules used for insulation and/or switching within electric power equipment

Note 1 to entry: A pure gas might contain contaminants.

EXAMPLE SF₆ is a typical example of a pure gas.