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INTERNATIONAL STANDARD



**High-voltage switchgear and controlgear –
Part 204: Rigid gas-insulated transmission lines for rated voltage above 52 kV**

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

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CONTENTS

FOREWORD	3
1 General	
1 Scope	5
2 Normative references	5
3 Terms and definitions	6
4 Normal and special service conditions	8
5 Ratings	9
6 Design and construction	12
7 Type tests	23
8 Routine tests	31
9 Guide to the selection of GIL (informative)	33
10 Information to be given with enquiries, tenders and orders (informative)	33
11 Transport, storage, installation, operation operating instructions and maintenance	36
12 Safety	42
13 Influence of the product on the environment	44
Annex A (informative) Estimation of continuous current	45
Annex B (informative) Earthing	50
Annex C (normative informative) Long-term testing of buried installations	54
Annex D (normative) Requirements for welds on pressurized parts	56
Bibliography	58
Figure B.1 – Example of earthing system together with active anti-corrosion system in the case of solid bonding of the enclosure at both ends	53
Table 1 – Second characteristic numeral of IP coding	16
Table D.1 – Quantity of NDTs	56
Table D.2 – Acceptance criteria of imperfections	57

INTERNATIONAL ELECTROTECHNICAL COMMISSION

HIGH-VOLTAGE SWITCHGEAR AND CONTROLGEAR –

**Part 204: Rigid gas-insulated transmission lines
for rated voltage above 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.
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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 62271-204:2011. 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 62271-204 has been prepared by subcommittee 17C: Assemblies, of IEC technical committee 17: High-voltage switchgear and controlgear. It is an International Standard.

This second edition cancels and replaces the first edition published in 2011. This edition constitutes a technical revision.

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

- a) update to be in line with IEC 62271-1:2017 and alignment of the voltage ratings and the test voltages.
- b) addition of new information for welds on pressurized parts and gas tightness.

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

Draft	Report on voting
17C/840/FDIS	17C/846/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 and IEC 62271-203:2022, to which it refers and which are 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 and IEC 62271-203:2022. 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 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

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HIGH-VOLTAGE SWITCHGEAR AND CONTROLGEAR –

Part 204: Rigid gas-insulated transmission lines for rated voltage above 52 kV

~~1~~ General

1 Scope

This part of IEC 62271 applies to rigid HV gas-insulated transmission lines (GIL) in which the insulation is obtained, at least partly, by ~~a non-corrosive insulating gas,~~ an insulating gas or gas mixture other than air at atmospheric pressure, for alternating current of rated voltages above 52 kV, and for service frequencies up to and including 60 Hz.

This document is ~~intended that this international standard be used~~ applicable where the provisions of IEC 62271-203 do not cover the application of GIL (see Note 3).

At each end of the HV gas-insulated transmission line, a specific element ~~may be~~ is used for the connection between the HV gas-insulated transmission line and other equipment like bushings, power transformers or reactors, cable boxes, metal-enclosed surge arresters, voltage transformers or GIS, covered by their own specification.

Unless otherwise specified, the HV gas-insulated transmission line is designed to be used under normal service conditions.

NOTE 1 In this document, the term "HV gas-insulated transmission line" is abbreviated to "GIL".

NOTE 2 In this document, the word "gas" means gas or gas mixture, as defined by the manufacturer.

NOTE 3 Examples of GIL applications:

- where all or part of the HV gas-insulated transmission line is directly buried;
- where the HV gas-insulated transmission line is located, wholly or partly, in an area accessible to public;
- where the HV gas-insulated transmission line is long (typically longer than 500 m) and the typical gas compartment length exceeds the common practice of GIS technology.

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 60050-151, International Electrotechnical Vocabulary (IEV) – Part 151: Electrical and magnetic devices~~

~~IEC 60050-441:1984, International Electrotechnical Vocabulary (IEV) – Chapter 441: Switchgear, controlgear and fuses~~

IEC 60060-1:2010, High-voltage test techniques – Part 1: General definitions and test requirements

IEC 60068-1:2013, Environmental testing – Part 1: General and guidance

IEC 60229:2007, *Electric cables – Tests on extruded oversheaths with a special protective function*

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

IEC 60287-3-1:19952017, *Electric cables – Calculation of the current rating – Part 3-1: Sections on Operating conditions – ~~Reference operating conditions and selection of cable type~~ Site reference conditions*

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

IEC 60480, ~~Guidelines for the checking and treatment of sulfur hexafluoride (SF₆) taken from electrical equipment and specification or its re-use~~ *Specifications for the re-use of sulfur hexafluoride (SF₆) and its mixtures in electrical equipment*

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

IEC 60529:1989/AMD1:1999

IEC 60529:1989/AMD2:2013

IEC 62271-1:20072017, *High-voltage switchgear and controlgear – Part 1: Common specifications for alternating current switchgear and controlgear*

IEC 62271-203:20142022, *High-voltage switchgear and controlgear – Part 203: AC gas-insulated metal-enclosed switchgear for rated voltages above 52 kV⁴*

~~IEC 62271-303, High-voltage switchgear and controlgear – Part 303: Use and handling of sulphur hexafluoride (SF₆)~~

IEC 62271-4:2013, *High-voltage switchgear and controlgear – Part 4: Handling procedures for sulphur hexafluoride (SF₆) and its mixtures*

~~ISO/IEC Guide 51, Safety aspects – Guidelines for their inclusion in standards~~

ISO 9606 (all parts), *Qualification test of welders – Fusion welding*

ISO 9712, *Non-destructive testing – Qualification and certification of NDT personnel*

ISO 14732, *Welding personnel – Qualification testing of welding operators and weld setters for mechanized and automatic welding of metallic materials*

ISO 15609 (all parts), *Specification and qualification of welding procedures for metallic materials – Welding procedure specification*

ISO 15614 (all parts), *Specification and qualification of welding procedures for metallic materials – Welding procedure test*

⁴ ~~To be published.~~

INTERNATIONAL STANDARD

NORME INTERNATIONALE

**High-voltage switchgear and controlgear –
Part 204: Rigid gas-insulated transmission lines for rated voltage above 52 kV**

**Appareillage à haute tension –
Partie 204: Lignes de transport rigides à isolation gazeuse de tension assignée
supérieure à 52 kV**

CONTENTS

FOREWORD	3
1 Scope	5
2 Normative references	5
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11 Transport, storage, installation, operating instructions and maintenance	32
12 Safety	38
13 Influence of the product on the environment	39
Annex A (informative) Estimation of continuous current	40
Annex B (informative) Earthing	45
Annex C (informative) Long-term testing of buried installations	49
Annex D (normative) Requirements for welds on pressurized parts	51
Bibliography	53
Figure B.1 – Example of earthing system together with active anti-corrosion system in the case of solid bonding of the enclosure at both ends	48
Table 1 – Second characteristic numeral of IP coding	14
Table D.1 – Quantity of NDTs	51
Table D.2 – Acceptance criteria of imperfections	52

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IEC 62271-203:2022, *High-voltage switchgear and controlgear – Part 203: AC gas-insulated metal-enclosed switchgear for rated voltages above 52 kV*

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SOMMAIRE

AVANT-PROPOS	57
1 Domaine d'application	59
2 Références normatives	59
3 Termes et définitions	60
4 Conditions normales et spéciales de service.....	62
5 Caractéristiques assignées.....	63
6 Conception et construction	65
7 Essais de type	75
8 Essais individuels de série	83
9 Guide pour le choix de la LIG (informative).....	84
10 Renseignements à donner dans les appels d'offres, les soumissions et les commandes (informative)	85
11 Transport, stockage, installation, instructions de fonctionnement et maintenance	87
12 Sécurité.....	94
13 Influence du produit sur l'environnement	95
Annexe A (informative) Évaluation du courant permanent	96
Annexe B (informative) Mise à la terre	101
Annexe C (informative) Essais de longue durée des installations enterrées	105
Annexe D (normative) Exigences relatives aux soudures des parties sous pression.....	107
Bibliographie.....	109
 Figure B.1 – Exemple de schéma de mise à la terre avec système anticorrosion actif dans le cas d'une enveloppe solidement connectée aux deux extrémités	 104
 Tableau 1 – Second chiffre caractéristique du codage IP	 68
Tableau D.1 – Nombre d'END	107
Tableau D.2 – Critères d'acceptation des défauts	108

COMMISSION ÉLECTROTECHNIQUE INTERNATIONALE

APPAREILLAGE À HAUTE TENSION –

**Partie 204: Lignes de transport rigides à isolation gazeuse
de tension assignée supérieure à 52 kV**

AVANT-PROPOS

- 1) La Commission Électrotechnique Internationale (IEC) est une organisation mondiale de normalisation composée de l'ensemble des comités électrotechniques nationaux (Comités nationaux de l'IEC). L'IEC a pour objet de favoriser la coopération internationale pour toutes les questions de normalisation dans les domaines de l'électricité et de l'électronique. À cet effet, l'IEC – entre autres activités – publie des Normes internationales, des Spécifications techniques, des Rapports techniques, des Spécifications accessibles au public (PAS) et des Guides (ci-après dénommés "Publication(s) de l'IEC"). Leur élaboration est confiée à des comités d'études, aux travaux desquels tout Comité national intéressé par le sujet traité peut participer. Les organisations internationales, gouvernementales et non gouvernementales, en liaison avec l'IEC, participent également aux travaux. L'IEC collabore étroitement avec l'Organisation Internationale de Normalisation (ISO), selon des conditions fixées par accord entre les deux organisations.
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- 9) L'attention est attirée sur le fait que certains des éléments de la présente Publication de l'IEC peuvent faire l'objet de droits de brevet. L'IEC ne saurait être tenue pour responsable de ne pas avoir identifié de tels droits de brevets.

L'IEC 62271-204 a été établie par le sous-comité 17C: Ensembles, du comité d'études 17 de l'IEC: Appareillage haute tension. Il s'agit d'une Norme internationale.

Cette deuxième édition annule et remplace la première édition parue en 2011. Cette édition constitue une révision technique.

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

- a) mise à jour par rapport à l'IEC 62271-1:2017 et alignement des caractéristiques assignées de tension et des tensions d'essai;
- b) ajout de nouvelles informations relatives aux soudures sur les parties sous pression et à l'étanchéité au gaz.

Le texte du présent est issu des documents suivants:

Projet	Rapport de vote
17C/840/FDIS	17C/846/RVD

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

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

Le présent 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.

Le présent document doit être utilisé conjointement avec l'IEC 62271-1:2017 et l'IEC 62271-203:2022, auxquelles il fait référence et qui sont applicables sauf spécification contraire. Pour faciliter le repérage des exigences correspondantes, ce document utilise une numérotation identique des articles et des paragraphes à celle de l'IEC 62271-1:2017 et de IEC 62271-203:2022. 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 du présent 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

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APPAREILLAGE À HAUTE TENSION –

Partie 204: Lignes de transport rigides à isolation gazeuse de tension assignée supérieure à 52 kV

1 Domaine d'application

La présente partie de l'IEC 62271 est applicable aux lignes de transport rigides haute tension à isolation gazeuse (LIG) dont l'isolation est réalisée, au moins partiellement, par un gaz isolant ou un mélange gazeux autre que l'air à la pression atmosphérique, pour un courant alternatif de tension assignée supérieure à 52 kV, pour des fréquences de service inférieures ou égales à 60 Hz.

Le présent document est applicable lorsque les dispositions de l'IEC 62271-203 ne couvrent pas l'application des LIG (voir la Note 3).

À chaque extrémité de la ligne de transport à isolation gazeuse HT, un élément spécifique est utilisé pour la connexion entre la ligne de transport à isolation gazeuse HT et d'autres matériels tels que les traversées, les transformateurs ou bobines d'inductance, les boîtes à câbles, les parafoudres sous enveloppe métallique, les transformateurs de tension ou les postes à isolation gazeuse, auxquels s'applique leur propre spécification.

La ligne de transport à isolation gazeuse HT est, sauf spécification contraire, conçue pour être utilisée dans les conditions normales de service.

NOTE 1 Dans le présent document, les "lignes de transport HT à isolation gazeuse" sont désignées par l'abréviation "LIG".

NOTE 2 Dans le présent document, le mot "gaz" signifie gaz ou mélange gazeux, selon la définition du constructeur.

NOTE 3 Exemples d'applications de LIG:

- lorsque tout ou partie de la ligne de transport à isolation gazeuse HT est directement enterrée;
- lorsque la ligne de transport à isolation gazeuse HT est située, entièrement ou partiellement, dans une zone accessible au public;
- lorsque la ligne de transport à isolation gazeuse HT est longue (généralement plus de 500 m) et que la longueur type du compartiment gazeux dépasse la valeur courante associée à la technologie des postes à isolation gazeuse.

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).

IEC 60060-1:2010, *Techniques des essais à haute tension – Partie 1: Définitions et exigences générales*

IEC 60068-1:2013, *Essais d'environnement – Partie 1: Généralités et lignes directrices*

IEC 60229:2007, *Câbles électriques – Essais sur les gaines extérieures extrudées avec fonction spéciale de protection*

IEC 60287-3-1:2017, *Câbles électriques – Calcul du courant admissible – Partie 3-1: Conditions de fonctionnement – Conditions du site de référence*

IEC 60376, *Spécification de la qualité technique de l'hexafluorure de soufre (SF₆) et des gaz complémentaires à employer dans les mélanges de SF₆ pour utilisation dans les matériels électriques*

IEC 60480, *Spécifications pour la réutilisation de l'hexafluorure de soufre (SF₆) et des mélanges contenant du SF₆ dans le matériel électrique*

IEC 60529, *Degrés de protection procurés par les enveloppes (Code IP)*
IEC 60529:1989/AMD1:1999
IEC 60529:1989/AMD2:2013

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

IEC 62271-203:2022, *Appareillage à haute tension – Partie 203: Appareillage sous enveloppe métallique à isolation gazeuse de tensions assignées supérieures à 52 kV*

IEC 62271-4:2013, *Appareillage à haute tension – Partie 4: Utilisation et manipulation de l'hexafluorure de soufre (SF₆) et des mélanges contenant du SF₆*

ISO 9606 (toutes les parties), *Épreuve de qualification des soudeurs – Soudage par fusion*

ISO 9712, *Essais non destructifs – Qualification et certification du personnel END*

ISO 14732, *Personnel en soudage – Épreuve de qualification des opérateurs soudeurs et des régulateurs en soudage pour le soudage mécanisé et le soudage automatique des matériaux métalliques*

ISO 15609 (toutes les parties), *Descriptif et qualification d'un mode opératoire de soudage pour les matériaux métalliques – Descriptif d'un mode opératoire de soudage*

ISO 15614 (toutes les parties), *Descriptif et qualification d'un mode opératoire de soudage pour les matériaux métalliques – Épreuve de qualification d'un mode de soudage*