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I.S. EN 62271-204:2011

High-voltage switchgear and controlgear -- Part 204: Rigid gas-insulated transmission lines for rated voltage above 52 kV (IEC 62271-204:2011 (EQV))

I.S. EN 62271-204:2011

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EN 62271-204

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English version

**High-voltage switchgear and controlgear -
Part 204: Rigid gas-insulated transmission lines
for rated voltage above 52 kV
(IEC 62271-204:2011)**

Appareillage à haute tension -
Part 204: Lignes de transport rigides à
isolation gazeuse de tension assignée
supérieure à 52 kV
(CEI 62271-204:2011)

Hochspannungs-Schaltgeräte und -
Schaltanlagen -
Teil 204: Starre gasisolierte
Übertragungsleitungen für
Bemessungsspannungen über 52 kV
(IEC 62271-204:2011)

This European Standard was approved by CENELEC on 2011-08-30. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CENELEC member.

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European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

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Foreword

The text of document 17C/510/FDIS, future edition 1 of IEC 62271-204, prepared by SC 17C, "High-voltage switchgear and controlgear assemblies", of IEC TC 17, "Switchgear and controlgear" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 62271-204:2011.

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) 2012-05-30
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2014-08-30

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CENELEC [and/or CEN] shall not be held responsible for identifying any or all such patent rights.

Endorsement notice

The text of the International Standard IEC 62271-204:2011 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following note has to be added for the standard indicated:

- [1] IEC 60071-1 NOTE Harmonized as EN 60071-1.

Annex ZA (normative)

Normative references to international publications with their corresponding European publications

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.

NOTE When an international publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
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	-	High-voltage test techniques - Part 1: General definitions and test requirements	EN 60060-1	-
IEC 60068-1	-	Environmental testing - Part 1: General and guidance	EN 60068-1	-
IEC 60229	2007	Tests on cable oversheaths which have a special protective function and are applied by extrusion	EN 60229	2008
IEC 60270	-	High-voltage test techniques - Partial discharge measurements	EN 60270	-
IEC 60287-3-1	1995	Electric cables - Calculation of the current rating - Part 3: Sections on operating conditions - Section 1: Reference operating conditions and selection of cable type	-	-
IEC 60376	-	Specification of technical grade sulfur hexafluoride (SF ₆) for use in electrical equipment	EN 60376	-
IEC 60480	-	Guidelines for the checking and treatment of sulphur hexafluoride (SF ₆) taken from electrical equipment and specification for its re-use	EN 60480	-
IEC 60529	1989	Degrees of protection provided by enclosures (IP Code)	EN 60529 + corr. May	1991 1993
IEC 62271-1	2007	High-voltage switchgear and controlgear - Part 1: Common specifications	EN 62271-1	2008
IEC 62271-203	201X ¹⁾	High-voltage switchgear and controlgear - Part 203: Gas-insulated metal-enclosed switchgear for rated voltages above 52 kV	EN 62271-203	201X ¹⁾
IEC/TR 62271-303	-	High-voltage switchgear and controlgear - Part 303: Use and handling of sulphur hexafluoride (SF ₆)	CLC/TR 62271-303	-

¹⁾ To be published.

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<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
ISO/IEC Guide 51	-	Safety aspects - Guidelines for their inclusion in standards	-	-

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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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International Standard IEC 62271-204 has been prepared by subcommittee 17C: High-voltage switchgear and controlgear assemblies, of IEC technical committee 17: Switchgear and controlgear.

This standard cancels and replaces IEC/TS 61640:1998. It is a technical revision.

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

- update to be in line with IEC 62271-1:2007 and 62271-203 and alignment of the voltage ratings and the test voltages;
- addition of new information for gas tightness and corrosion protection.

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

FDIS	Report on voting
17C/510/FDIS	17C/520/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. It should also be read in conjunction with IEC 62271-203.¹

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.

¹ To be published.

HIGH-VOLTAGE SWITCHGEAR AND CONTROLGEAR –

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

1 General

1.1 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, 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.

It is intended that this international standard be used 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 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 international standard, the term "HV gas-insulated transmission line" is abbreviated to "GIL".

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

NOTE 3 Examples of GIL applications are given:

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

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 (IEV) – Part 151: Electrical and magnetic devices*

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

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

IEC 60068-1, *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 60287-3-1:1995, *Electric cables – Calculation of the current rating – Part 3-1: Sections on operating conditions – Reference operating conditions and selection of cable type*

IEC 60376, *Specification of technical grade sulfur hexafluoride (SF₆) 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*

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

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

IEC 62271-203:2011, *High-voltage switchgear and controlgear – Part 203: Gas-insulated metal-enclosed switchgear for rated voltages above 52 kV²*

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

ISO/IEC Guide 51, *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:

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

The normal service conditions which apply to a GIL depending on the installation conditions are given in 2.101, 2.102 and 2.103. When more than one of these installation conditions apply, the relevant subclause shall apply to each section of the GIL.

2.101 Installation in open air

For determining the ratings of GIL for open air installation, the normal service conditions of IEC 62271-1 shall apply. Typical rating conditions are also valid for open trenches.

If the actual service conditions differ from the normal service conditions, the ratings shall be adapted accordingly.

Unless otherwise specified by the user, the special service conditions given in the IEC 62271-1 shall apply.

² To be published.

2.102 Buried installation

Typical values for thermal resistivity and soil temperature are:

- 1,2 K · m/W, and 20 °C in summer;
- 0,85 K · m/W, and 10 °C in winter.

For guidance, values given in IEC 60287-3-1 may be considered.

NOTE 1 For long distance transmission lines (several kilometres) site measurement of soil resistivity should also be considered.

NOTE 2 The use of controlled backfill with a given soil thermal resistivity may also be considered.

NOTE 3 A risk of thermal runaway exists if the soil surrounding the buried GIL becomes dry. In order not to dry out the soil, a maximum service temperature of the enclosure in the range of 50 °C to 60 °C is generally considered acceptable.

The depth of laying shall be agreed between manufacturer and user. The determination of depth of laying shall take into account thermo mechanical stresses, safety requirements and local regulations.

2.103 Installation in tunnel, shaft or similar situation

Forced cooling is an adequate method and used in case of tunnel, shaft or similar installations.

In the case of long vertical shafts and inclined tunnels or sections thereof, attention shall be paid to thermal and density gradients, especially if a gas mixture is used.

3 Terms and definitions

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

3.101

area accessible to public

access not restricted to authorized personnel

NOTE A GIL installed above ground and outside a substation is considered to be "installed in an area accessible to public".

3.102

gas-insulated transmission lines

GIL

metal-enclosed lines in which the insulation is obtained, at least partly, by an insulating gas other than air at atmospheric pressure, with the external enclosure intended to be earthed

3.103

GIL enclosure

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

3.104

compartment

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

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