

High-voltage switchgear and controlgear -- Part 209: Cable connections for gas-insulated metal-enclosed switchgear for rated voltages above 52 kV - Fluid-filled and extruded insulation cables - Fluid-filled and dry-type cable-terminations

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EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

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| <p>Käesolev Eesti standard EVS-EN 62271-209:2007 sisaldab Euroopa standardi EN 62271-209:2007 ingliskeelset teksti.</p> <p>Käesolev dokument on jõustatud 17.12.2007 ja selle kohta on avaldatud teade Eesti standardiorganisatsiooni ametlikus väljaandes.</p> <p>Standard on kättesaadav Eesti standardiorganisatsioonist.</p> | <p>This Estonian standard EVS-EN 62271-209:2007 consists of the English text of the European standard EN 62271-209:2007.</p> <p>This document is endorsed on 17.12.2007 with the notification being published in the official publication of the Estonian national standardisation organisation.</p> <p>The standard is available from Estonian standardisation organisation.</p> |
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| <p>Käsitlusala:</p> <p>This standard covers the connection assembly of fluid-filled and extruded cables to gasinsulated metal enclosed switchgear (GIS), in single- or three-phase arrangements where the cable-terminations are fluid-filled or dry type and there is a separating insulating barrier between the cable insulation and the gas insulation of the switchgear. The purpose of this standard is to establish electrical and mechanical interchangeability between cable-terminations and the gas-insulated metal-enclosed switchgear and to determine the limits of supply. It complements and amends, if necessary, the relevant IEC standards. For the purpose of this standard the term "switchgear" is used for "gas-insulated metal enclosed switchgear". It does not cover directly immersed cable terminations, as described in CIGRE brochure 89.</p> | <p>Scope:</p> <p>This standard covers the connection assembly of fluid-filled and extruded cables to gasinsulated metal enclosed switchgear (GIS), in single- or three-phase arrangements where the cable-terminations are fluid-filled or dry type and there is a separating insulating barrier between the cable insulation and the gas insulation of the switchgear. The purpose of this standard is to establish electrical and mechanical interchangeability between cable-terminations and the gas-insulated metal-enclosed switchgear and to determine the limits of supply. It complements and amends, if necessary, the relevant IEC standards. For the purpose of this standard the term "switchgear" is used for "gas-insulated metal enclosed switchgear". It does not cover directly immersed cable terminations, as described in CIGRE brochure 89.</p> |
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ICS 29.130.10

Võtmesõnad:

**High-voltage switchgear and controlgear -
Part 209: Cable connections for gas-insulated metal-enclosed switchgear
for rated voltages above 52 kV -
Fluid-filled and extruded insulation cables -
Fluid-filled and dry-type cable-terminations
(IEC 62271-209:2007)**

Appareillage à haute tension -
Partie 209: Raccordement de câbles
pour appareillage sous enveloppe
métallique à isolation gazeuse de tension
assignée supérieure à 52 kV -
Câbles remplis d'un fluide
ou à isolation extrudée -
Extrémité de câble sèche
ou remplie d'un fluide
(CEI 62271-209:2007)

Hochspannungs-Schaltgeräte
und -Schaltanlagen -
Teil 209: Kabelanschlüsse für gasisolierte
metallgekapselte Schaltanlagen
für Bemessungsspannungen über 52 kV -
Kabel mit fluidgefüllter
und extrudierter Isolierung -
Fluidgefüllte und feststoffisolierte
Kabelendverschlüsse
(IEC 62271-209:2007)

This European Standard was approved by CENELEC on 2007-10-01. 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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CENELEC

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

Central Secretariat: rue de Stassart 35, B - 1050 Brussels

Foreword

The text of document 17C/405/FDIS, future edition 1 of IEC 62271-209, 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 was approved by CENELEC as EN 62271-209 on 2007-10-01.

The following dates were fixed:

- latest date by which the EN has to be implemented
at national level by publication of an identical
national standard or by endorsement (dop) 2008-07-01
- latest date by which the national standards conflicting
with the EN have to be withdrawn (dow) 2010-10-01

Annexes ZA and ZB have been added by CENELEC.

Endorsement notice

The text of the International Standard IEC 62271-209:2007 was approved by CENELEC as a European Standard without any modification.

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 60038 (mod) | 1983 | IEC standard voltages ¹⁾ | HD 472 S1 | 1989 |
| A1 | 1994 | | + corr. February | 2002 |
| A2 | 1997 | | | |
| IEC 60141 | Series | Tests on oil-filled and gas-pressure cables and their accessories | – | – |
| IEC 60141-1 | 1993 | Tests on oil-filled and gas-pressure cables and their accessories - Part 1: Oil-filled, paper- insulated, metal-sheathed cables and accessories for alternating voltages up to and including 400 kV | – | – |
| IEC 60141-2 | 1963 | Tests on oil-filled and gas-pressure cables and their accessories - Part 2: Internal gas-pressure cables and accessories for alternating voltages up to 275 kV | – | – |
| IEC 60694 | 1996 | Common specifications for high-voltage switchgear and controlgear standards | EN 60694 + corr. May | 1996 1999 |
| IEC 60840 | 2004 | 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 62067 A1 | 2001 2006 | 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 62271-203 | 2003 | High-voltage switchgear and controlgear - Part 203: Gas-insulated metal-enclosed switchgear for rated voltages above 52 kV | EN 62271-203 | 2004 |
| CIGRE WG 23-10 Report, ELECTRA 151 | 1993 | Earthing of GIS - An Application Guide | – | – |

¹⁾ The title of HD 472 S1 is: Nominal voltages for low voltage public electricity supply systems.

| <u>Publication</u> | <u>Year</u> | <u>Title</u> | <u>EN/HD</u> | <u>Year</u> |
|-------------------------------------|-------------|--|--------------|-------------|
| CIGRE Brochure 89, 1995 WG 21.06 | | Accessories for HV Extruded Cables - Chapter 2.1.5: Directly Immersed Metal Enclosed GIS Termination | – | – |

Annex ZB (informative)

A-deviations

A-deviation: National deviation due to regulations, the alteration of which is for the time being outside the competence of the CENELEC national member.

This European Standard does not fall under any Directive of the EC.

In the relevant CENELEC countries these A-deviations are valid instead of the provisions of the European Standard until they have been removed.

| <u>Clause</u> | <u>Deviation</u> |
|---------------|------------------|
|---------------|------------------|

| | |
|----------|--------------|
| 1 | Italy |
|----------|--------------|

(DM 1 December 1980 and DM 10 September 1981 published in Gazzetta Ufficiale no. 285 dated 16.10.1981)

For insulation-enclosed switchgear and controlgear containing gas-filled compartments, the design pressure is limited to a maximum of 0,5 bar (gauge) and the volume is limited to a maximum of 2 m³. Gas filled compartments having a design pressure exceeding 0,5 bar (gauge) or a volume exceeding 2 m³ shall be designed according to the Italian pressure vessel code for electrical switchgear.

INTERNATIONAL STANDARD

NORME INTERNATIONALE

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métallique à isolation gazeuse de tension assignée supérieure à 52 kV –
Câbles remplis d'un fluide ou à isolation extrudée – Extrémité de câble sèche
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INTERNATIONAL STANDARD

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

HIGH-VOLTAGE SWITCHGEAR AND CONTROLGEAR –

**Part 209: Cable connections for gas-insulated metal-enclosed
switchgear for rated voltages above 52 kV –
Fluid-filled and extruded insulation cables –
Fluid-filled and dry-type cable-terminations**

FOREWORD

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International Standard IEC 62271-209 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 62271-209 cancels and replaces the second edition of IEC/TS 60859 and constitutes a technical revision. The changes from IEC/TS 60859 are as follows:

- the minimum voltage rating was changed from "72,5 kV" to "above 52 kV";
- the current rating was increased to 3150 A;

- simplifications and modifications of the dimension tables in Figure 2 and Figure 4 such as diameters for 123 kV to 170 kV have been adopted in order to accommodate larger cable cross-sections; new dimensions accept old terminations, new terminations may not meet old GIS standards;
- the following dimensions have been deleted: I1, I3 as well as note 3 on Figure 4;
- in Figure 4, new dimensions have been adopted for the voltage range from 245 kV to 300 kV, interchangeability for 245 kV to 300 kV is not maintained due to reduction in GIS cable termination housing;
- the lengths I7 and I8 have been modified;
- changes in the text in relation to minimum functional pressure for insulation p_{me} (Table 1 has been removed);
- the limit of 170 kV for 3-phase application was deleted (Subclause 5.2);
- Figure 5 was deleted.

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

| FDIS | Report on voting |
|--------------|------------------|
| 17C/405/FDIS | 17C/412/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.

A list of all the parts in the IEC 62271 series, under the general title *High-voltage switchgear and controlgear*, can be found on the IEC website.

The committee has decided that the contents of this publication will remain unchanged until the maintenance result 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.

HIGH-VOLTAGE SWITCHGEAR AND CONTROLGEAR –

Part 209: Cable connections for gas-insulated metal-enclosed switchgear for rated voltages above 52 kV – Fluid-filled and extruded insulation cables – Fluid-filled and dry-type cable-terminations

1 Scope

This standard covers the connection assembly of fluid-filled and extruded cables to gas-insulated metal enclosed switchgear (GIS), in single- or three-phase arrangements where the cable-terminations are fluid-filled or dry type and there is a separating insulating barrier between the cable insulation and the gas insulation of the switchgear.

The purpose of this standard is to establish electrical and mechanical interchangeability between cable-terminations and the gas-insulated metal-enclosed switchgear and to determine the limits of supply. It complements and amends, if necessary, the relevant IEC standards. For the purpose of this standard the term "switchgear" is used for "gas-insulated metal enclosed switchgear".

It does not cover directly immersed cable terminations, as described in CIGRE brochure 89.

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 60038:1983, *IEC standard voltages*¹
Amendment 1 (1994)
Amendment 2 (1997)

IEC 60141 (all parts), *Tests on oil-filled and gas-pressure cables and their accessories*

IEC 60141-1:1993, *Tests on oil-filled and gas-pressure cables and their accessories – Part 1: Oil-filled, paper-insulated, metal-sheathed cables and accessories for alternating voltages up to and including 400 kV*

IEC 60141-2:1963, *Tests on oil-filled and gas-pressure cables and their accessories – Part 2: Internal gas-pressure cables and accessories for alternating voltages up to 275 kV*

IEC 60694:1996, *Common specifications for high-voltage switchgear and controlgear standards*

IEC 60840:2004, *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*

¹ There exists a consolidated version (2002) including Amendment 1 and 2.

IEC 62067:2001, *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*

Amendment 1 (2006)

IEC 62271-203:2003, High-voltage switchgear and controlgear – Part 203: Gas-insulated metal-enclosed switchgear for rated voltages above 52 kV

Report of CIGRE WG 23-10, ELECTRA 151, December 1993, *Earthing of GIS – An Application Guide*

CIGRE brochure 89: *Accessories for HV Extruded Cables, CIGRE WG 21.06, 1995, Chapter 2.1.5 Directly Immersed Metal Enclosed GIS Termination*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1

cable-termination

equipment fitted to the end of a cable to ensure electrical connection with other parts of the system and to maintain the insulation up to the point of connection. Two types are described in this standard.

3.1.1

fluid-filled cable-termination

cable-termination which comprises of a separating insulating barrier between the cable insulation and the gas insulation of switchgear. The cable-termination includes an insulating fluid as part of the cable connection assembly.

3.1.2

dry-type cable-termination

cable-termination which comprises an elastomeric electrical stress control component in intimate contact with a separating insulating barrier (insulator) between the cable insulation and the gas insulation of the switchgear. The cable-termination does not require any insulating fluid.

3.2

main-circuit end terminal

part of the main circuit of a gas-insulated metal enclosed switchgear forming part of the connection interface

3.3

cable connection enclosure

part of the gas-insulated metal-enclosed switchgear which houses the cable-termination and the main-circuit end terminal

3.4

cable connection assembly

combination of a cable-termination, a cable connection enclosure and a main-circuit end terminal, which mechanically and electrically connects the cable to the gas-insulated metal enclosed switchgear

3.5

design pressure

pressure used to determine the thickness of the enclosure and the components of the cable termination subjected to that pressure (according to IEC 62271-203:2003)