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High-voltage switchgear and controlgear - Part 5: Common specifications for direct current switchgear and controlgear

Táto norma obsahuje anglickú verziu európskej normy.
This standard includes the English version of the European Standard.

Táto norma bola oznámená vo Vestníku ÚNMS SR č. 03/26

Obsahuje: CLC IEC/TS 62271-5:2025, IEC TS 62271-5:2024

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High-voltage switchgear and controlgear - Part 5: Common specifications for direct current switchgear and controlgear (IEC/TS 62271-5:2024)

Appareillage à haute tension - Partie 5: Spécifications communes pour appareillage à courant continu (IEC/TS 62271-5:2024)

Hochspannungs-Schaltgeräte und -Schaltanlagen - Teil 5: Gemeinsame Bestimmungen für Gleichstrom-Schaltgeräte und -Schaltanlagen (IEC/TS 62271-5:2024)

This Technical Specification was approved by CENELEC on 2025-12-08.

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

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

Ref. No. CLC IEC/TS 62271-5:2025 E

European foreword

This document (CLC IEC/TS 62271-5:2025) consists of the text of IEC/TS 62271-5:2024 prepared by IEC/TC 17 "High-voltage switchgear and controlgear".

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

Any feedback and questions on this document should be directed to the users' national committee. A complete listing of these bodies can be found on the CENELEC website.

Endorsement notice

The text of the International Technical Specification/Technical Report IEC/TS 62271-5:2024 was approved by CENELEC as a European Technical Specification/Technical Report without any modification.

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

IEC/TS 62271-314	NOTE	Approved as CLC IEC/TS 62271-314
IEC/TS 62271-316	NOTE	Approved as CLC IEC/TS 62271-316
IEC/TS 62271-318	NOTE	Approved as CLC IEC/TS 62271-318
IEC 60034-1	NOTE	Approved as EN 60034-1
IEC 60051-1	NOTE	Approved as EN 60051-1
IEC 60051-2	NOTE	Approved as EN IEC 60051-2
IEC 60051-4	NOTE	Approved as EN IEC 60051-4
IEC 60051-5	NOTE	Approved as EN IEC 60051-5
IEC 60059	NOTE	Approved as EN 60059
IEC 60064	NOTE	Approved as EN 60064
IEC 60068-2 series	NOTE	Approved as EN IEC 60068-2 series
IEC 60073	NOTE	Approved as EN 60073
IEC 60081	NOTE	Approved as EN 60081
IEC 60130 series	NOTE	Approved as EN 60130 series
IEC 60228	NOTE	Approved as EN IEC 60228
IEC 60269-1	NOTE	Approved as EN IEC 60269-1
IEC 60309-1	NOTE	Approved as EN IEC 60309-1
IEC 60309-2	NOTE	Approved as EN IEC 60309-2
IEC 60393-1	NOTE	Approved as EN 60393-1

IEC 60445	NOTE	Approved as EN IEC 60445
IEC 60447	NOTE	Approved as EN 60447
IEC 60664-1	NOTE	Approved as EN IEC 60664-1
IEC 60669-1	NOTE	Approved as EN 60669-1
IEC 60695-1 series	NOTE	Approved as EN 60695-1 series
IEC 60695-7 series	NOTE	Approved as EN 60695-7 series
IEC 60721-1	NOTE	Approved as EN 60721-1
IEC 60721-2 series	NOTE	Approved as EN 60721-2 series
IEC 60721-2-2	NOTE	Approved as EN IEC 60721-2-2
IEC 60721-2-4	NOTE	Approved as EN IEC 60721-2-4
IEC 60721-3 series	NOTE	Approved as EN IEC 60721-3 series
IEC 60721-3-4	NOTE	Approved as EN IEC 60721-3-4
IEC 60730-2-9	NOTE	Approved as EN IEC 60730-2-9
IEC 60730-2-13	NOTE	Approved as EN IEC 60730-2-13
IEC 60947-2	NOTE	Approved as EN IEC 60947-2
IEC 60947-3	NOTE	Approved as EN IEC 60947-3
IEC 60947-4-1	NOTE	Approved as EN IEC 60947-4-1
IEC 60947-4-2	NOTE	Approved as EN IEC 60947-4-2
IEC 60947-5-1	NOTE	Approved as EN IEC 60947-5-1
IEC 60947-7-1	NOTE	Approved as EN IEC 60947-7-1
IEC 60947-7-2	NOTE	Approved as EN 60947-7-2
IEC 61020-1	NOTE	Approved as EN IEC 61020-1
IEC 61810 series	NOTE	Approved as EN 61810 series
IEC 61810-1	NOTE	Approved as EN 61810-1
IEC 61810-2	NOTE	Approved as EN 61810-2
IEC 61850 series	NOTE	Approved as EN 61850 series
IEC 61936-1:2021	NOTE	Approved as EN IEC 61936-1:2021 (not modified) +A11:2025
IEC 62271-3:2015	NOTE	Approved as EN 62271-3:2015 (not modified)
IEC 62326-1	NOTE	Approved as EN 62326-1
IEC 62501	NOTE	Approved as EN IEC 62501
IEC 62612	NOTE	Approved as EN 62612

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.cencenelec.eu.

Publication	Year	Title	EN/HD	Year
IEC 60038 (mod)	2009	IEC standard voltages	EN 60038	2011
IEC 60050-614	2016	International Electrotechnical Vocabulary - Part 614: Generation, transmission and distribution of electricity - Operation	-	-
IEC 60050-811	-	International electrotechnical vocabulary - Part 811: Electric traction	-	-
IEC 60050-826	2022	International Electrotechnical Vocabulary (IEV) - Part 826: Electrical installations	-	-
IEC 60060-1	-	High-voltage test techniques - Part 1: General terminology and test requirements	EN IEC 60060-1	-
IEC 60068-2-1	2007	Environmental testing - Part 2-1: Tests - Test A: Cold	EN 60068-2-1	2007
IEC 60068-2-2	2007	Environmental testing - Part 2-2: Tests - Test B: Dry heat	EN 60068-2-2	2007
IEC 60068-2-17	1994	Basic environmental testing procedures - Part 2-17: Tests - Test Q: Sealing	EN 60068-2-17	1994
IEC 60068-2-30	2005	Environmental testing - Part 2-30: Tests - Test Db: Damp heat, cyclic (12 h + 12 h cycle)	EN 60068-2-30	2005
IEC 60071-1	2019	Insulation co-ordination - Part 1: Definitions, principles and rules	EN IEC 60071-1	2019
IEC 60071-2	2018	Insulation co-ordination - Part 2: Application guidelines	EN IEC 60071-2	2018
IEC 60071-11	2022	Insulation co-ordination - Part 11:Definitions, principles and rules for HVDC system	EN IEC 60071-11	2022
IEC 60085	2007	Electrical insulation - Thermal evaluation and designation	EN 60085	2008
IEC 60255-21-1	1988	Electrical relays - Part 21: Vibration, shock, bump and seismic tests on measuring relays and protection equipment - Section One: Vibration tests (sinusoidal)	EN 60255-21-1	1995

Publication	Year	Title	EN/HD	Year
IEC 60270	-	High-voltage test techniques - Charge-based measurement of partial discharges	EN IEC 60270	-
IEC 60296	-	Fluids for electrotechnical applications - Mineral insulating oils for electrical equipment	EN IEC 60296	-
IEC 60376	-	Specification of technical grade sulphur hexafluoride (SF6) and complementary gases to be used in its mixtures for use in electrical equipment	EN IEC 60376	-
IEC 60417	2006	Graphical symbols for use on equipment	-	-
IEC 60437	-	Radio interference test on high-voltage insulators	EN IEC 60437	-
IEC 60480	-	Specifications for the re-use of sulphur hexafluoride (SF6) and its mixtures in electrical equipment	EN IEC 60480	-
IEC 60512-2-2	-	Connectors for electronic equipment - Tests and measurements - Part 2-2: Electrical continuity and contact resistance tests - Test 2b: Contact resistance - Specified test current method	EN 60512-2-2	-
IEC 60529	1989	Degrees of protection provided by enclosures (IP Code)	EN 60529	1991
-	-		+ AC	1993
+ A1	1999		+ A1	2000
+ A2	2013		+ A2	2013
IEC 60633	2019	High-voltage direct current (HVDC) transmission - Vocabulary	EN IEC 60633	2019
IEC/TS 60815-4	2019	Selection and dimensioning of high-voltage insulators intended for use in polluted conditions - Part 4: Insulators for d.c. systems	-	-
IEC 61000-4-4	-	Electromagnetic compatibility (EMC) - Part 4-4: Testing and measurement techniques - Electrical fast transient/burst immunity test	EN 61000-4-4	-
IEC 61000-4-11	-	Electromagnetic compatibility (EMC) - Part 4-11: Testing and measurement techniques - Voltage dips, short interruptions and voltage variations immunity tests for equipment with input current up to 16 A per phase	EN IEC 61000-4-11	-
IEC 61000-4-17	1999	Electromagnetic compatibility (EMC) - Part 4-17: Testing and measurement techniques - Ripple on d.c. input power port immunity test	EN 61000-4-17	1999
IEC 61000-4-18	-	Electromagnetic compatibility (EMC) - Part 4-18: Testing and measurement techniques - Damped oscillatory wave immunity test	EN IEC 61000-4-18	-

CLC IEC/TS 62271-5:2025 (E)

Publication	Year	Title	EN/HD	Year
IEC 61000-4-29	-	Electromagnetic compatibility (EMC) - Part 4-29: Testing and measurement techniques - Voltage dips, short interruptions and voltage variations on d.c. input power port immunity tests	EN 61000-4-29	-
IEC 61000-6-2	-	Electromagnetic compatibility (EMC) - Part 6-2: Generic standards - Immunity standard for industrial environments	EN IEC 61000-6-2	-
IEC 61000-6-5	-	Electromagnetic compatibility (EMC) - Part 6-5: Generic standards - Immunity for equipment used in power station and substation environment	EN 61000-6-5	-
IEC 61180	-	High-voltage test techniques for low-voltage equipment - Definitions, test and procedure requirements, test equipment	EN 61180	-
IEC/TS 61245	-	Artificial pollution tests on high-voltage ceramic and glass insulators to be used on d.c. systems	-	-
IEC 61810-7	2006	Electromechanical elementary relays - Part 7: Test and measurement procedures	EN 61810-7	2006
IEC 62262	2002	Degrees of protection provided by enclosures for electrical equipment against external mechanical impacts (IK code)	EN 62262	2002
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
IEC 62271-4	-	High-voltage switchgear and controlgear - Part 4: Handling procedures for gases for insulation and/or switching	EN IEC 62271-4	-
CISPR 11 (mod)	2015	Industrial, scientific and medical equipment - Radio-frequency disturbance characteristics - Limits and methods of measurement	EN 55011	2016
-	-		+ A11	2020
CISPR 16-1	series	Specification for radio disturbance and immunity measuring apparatus and methods	EN IEC 55016-1	series
CISPR/TR 18-2	-	Radio interference characteristics of overhead power lines and high-voltage equipment - Part 2: Methods of measurement and procedure for determining limits	-	-

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High-voltage switchgear and controlgear –
Part 5: Common specifications for direct current switchgear and controlgear

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TECHNICAL SPECIFICATION

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High-voltage switchgear and controlgear – Part 5: Common specifications for direct current switchgear and controlgear

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CONTENTS

INTERNATIONAL ELECTROTECHNICAL COMMISSION

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HIGH-VOLTAGE SWITCHGEAR AND CONTROLGEAR –

Part 5: Common specifications for direct current switchgear and controlgear

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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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.
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IEC TS 62271-5 has been prepared by IEC technical committee 17: High-voltage switchgear and controlgear. It is a Technical Specification.

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

Draft	Report on voting
17/1136/DTS	17/1143B/RVDTS

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 document 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.

The list of all parts of 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 document will remain unchanged until the stability date indicated on the IEC website under “http://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

This Technical Specification has been prepared by TC 17 and it defines common specifications for high-voltage direct current (HVDC) switchgear and controlgear covering both types of air insulated (AIS) and gas insulated (GIS) equipment of HVDC substations. This document includes rules for service conditions, ratings, design and construction requirements. Test requirements and criteria to proof for passing type and routine tests are defined in this document for development and manufacturing of HVDC switchgear.

This specification is applicable for both LCC and VSC HVDC technology.

SC 17A is in the process of preparing documents for the following HVDC switching devices:

– circuit-breakers (IEC TS 62271-313 [1])[1];
– disconnectors and earthing switches (IEC TS 62271-314 [2]);
– transfer switches (IEC TS 62271-315 [3]);
– by-pass switches and paralleling switches (IEC TS 62271-316 [4]).

SC 17C is in the process of preparing a document for DC gas insulated switchgears (IEC TS 62271-318 [5]).

Standardization of direct voltages is the responsibility of TC 8 (System aspects of electrical energy supply).

TC 99 (Insulation co-ordination and system engineering of high voltage electrical power installations above 1,0 kV AC and 1,5 kV DC) defines requirements of DC substations for safety of insulation, equipment, installation and earthing (IEC 61936-2).

TC 115 (High Voltage Direct Current (HVDC) transmission for DC voltages above 100 kV) is responsible for DC transmission system aspects. It is the responsibility of TC 115 to define requirements for different equipment (e. g. switching devices) from system point of view. These definitions are implemented in documents from other TCs. Several Working Groups and Maintenance Teams are preparing documents on reliability, EMC, asset management, system design, DC harmonics, testing, HVDC grids, VSC and LCC converter and insulation coordination for HVDC systems.

[1] Numbers in square brackets refer to the Bibliography.

HIGH-VOLTAGE SWITCHGEAR AND CONTROLGEAR –

Part 5: Common specifications for direct current switchgear and controlgear

1 Scope

This part of IEC 62271, which is a Technical Specification, applies to DC switchgear and controlgear designed for operation on HVDC transmission systems having direct voltages of 100 kV and above.

This document applies to all high-voltage switchgear and controlgear for indoor and/or outdoor installation except as otherwise specified in the relevant IEC documents for the particular type of switchgear and controlgear.

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 60038:2009, *IEC standard voltages*

IEC 60050-614:2016, *International Electrotechnical Vocabulary (IEV) – Part 614: Generation, transmission and distribution of electricity – Operation*

IEC 60050-811, *International Electrotechnical Vocabulary (IEV) – Part 811: Electric traction*

IEC 60050-826:2022, *International Electrotechnical Vocabulary (IEV) – Part 826: Electrical installations*

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

IEC 60068-2-1:2007, *Environmental testing – Part 2-1: Tests – Test A: Cold*

IEC 60068-2-2:2007, *Environmental testing – Part 2-2: Tests – Test B: Dry heat*

IEC 60068-2-17:1994, *Basic environmental testing procedures – Part 2-17: Tests – Test Q: Sealing*

IEC 60068-2-30:2005, *Environmental testing – Part 2-30: Tests – Test Db: Damp heat, cyclic (12 h + 12 h cycle)*

IEC 60071-1:2019, *Insulation co-ordination – Part 1: Definitions, principles and rules*

IEC 60071-2:2018, *Insulation co-ordination – Part 2: Application guidelines*

IEC 60071-11:2022, *Insulation co-ordination – Part 11: Definitions, principles and rules for HVDC system*

IEC 60085:2007, *Electrical insulation – Thermal evaluation and designation*

IEC 60255-21-1:1988, *Electrical relays – Part 21: Vibration, shock, bump and seismic tests on measuring relays and protection equipment – Section One: Vibration tests (sinusoidal)*

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

IEC 60296, *Fluids for electrotechnical applications – Mineral insulating oils for electrical equipment*

IEC 60376, *Specification of technical grade sulphur hexafluoride (SF_6) and complementary gases to be used in its mixtures for use in electrical equipment*

IEC 60417:2006, *Graphical symbols for use on equipment (available at http://www.graphical-symbols.info/equipment)*

IEC 60437, *Radio interference test on high-voltage insulators*

IEC 60480, *Specifications for the re-use of sulphur hexafluoride (SF_6) and its mixtures in electrical equipment*

IEC 60512-2-2, *Connectors for electronic equipment – Tests and measurements – Part 2-2: Electrical continuity and contact resistance tests – Test 2b: Contact resistance – Specified test current method*

IEC 60529:1989, *Degrees of protection provided by enclosures (IP Code)*
IEC 60529:1989/AMD1:1999
IEC 60529:1989/AMD2:2013

IEC 60633:2019, *High-voltage direct current (HVDC) transmission – Vocabulary*

IEC TS 60815-4:2016, *Selection and dimensioning of high-voltage insulators intended for use in polluted conditions – Part 4: Insulators for DC systems*

IEC 61000-4-4, *Electromagnetic compatibility (EMC) – Part 4-4: Testing and measurement techniques – Electrical fast transient/burst immunity test*

IEC 61000-4-11, *Electromagnetic compatibility (EMC) – Part 4-11: Testing and measurement techniques – Voltage dips, short interruptions and voltage variations immunity tests for equipment with input current up to 16 A per phase*

IEC 61000-4-17:1999, *Electromagnetic compatibility (EMC) – Part 4-17: Testing and measurement techniques – Ripple on d.c. input power port immunity test*

IEC 61000-4-18, *Electromagnetic compatibility (EMC) – Part 4-18: Testing and measurement techniques – Damped oscillatory wave immunity test*

IEC 61000-4-29, *Electromagnetic compatibility (EMC) – Part 4-29: Testing and measurement techniques – Voltage dips, short interruptions and voltage variations on DC input power port immunity tests*

IEC 61000-6-2, *Electromagnetic compatibility (EMC) – Part 6-2: Generic standards – Immunity standard for industrial environments*

IEC 61000-6-5, *Electromagnetic compatibility (EMC) – Part 6-5: Generic standards – Immunity for equipment used in power station and substation environment*

IEC 61180, *High-voltage test techniques for low-voltage equipment – Definitions, test and procedure requirements, test equipment*

IEC TS 61245, *Artificial pollution tests on high-voltage ceramic and glass insulators to be used on DC systems*

IEC 61810-7:2006, *Electromechanical elementary relays – Part 7: Test and measurement procedures*

IEC 62262:2002, *Degrees of protection provided by enclosures for electrical equipment against external mechanical impacts (IK code)*

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

IEC 62271-4, *High-voltage switchgear and controlgear – Part 4: Handling procedures for gases for insulation and/or switching*

CISPR 11:2015, *Industrial, scientific and medical equipment – Radio-frequency disturbance characteristics – Limits and methods of measurement*

CISPR 16-1 (all parts), *Specification for radio disturbance and immunity measuring apparatus and methods – Part 1: Radio disturbance and immunity measuring apparatus*

CISPR TR 18-2, *Radio interference characteristics of overhead power lines and high-voltage equipment – Part 2: Methods of measurement and procedure for determining limits*