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JUHTIMISAPARATUURI ÜLDLIIGITUS**

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

EESTI STANDARDI EESSÕNA**NATIONAL FOREWORD**

See Eesti standard EVS-EN 62271-1:2017+A1:2022 sisaldab Euroopa standardi EN 62271-1:2017 ja selle muudatuse A1:2021 ingliskeelset teksti.	This Estonian standard EVS-EN 62271-1:2017+A1:2022 consists of the English text of the European standard EN 62271-1:2017 and its amendment A1:2021.
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Appareillage à haute tension - Partie 1: Spécifications communes pour appareillage à courant alternatif (IEC 62271-1:2017 + IEC 62271-1:2017/AMD1:2021)

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

IEC 60447	NOTE Harmonized as EN 60447.
IEC 60721-2-4	NOTE Harmonized as prEN 60721-2-4 ¹⁾ .
IEC 60721-2-2	NOTE Harmonized as EN 60721-2-2.
IEC 60721-3-3	NOTE Harmonized as EN 60721-3-3.
IEC 60721-3-4	NOTE Harmonized as EN 60721-3-4.
IEC 60664-1	NOTE Harmonized as EN 60664-1.
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IEC 62271-207	NOTE Harmonized as EN 62271-207.
IEC 60721-1	NOTE Harmonized as EN 60721-1.
IEC 60721-2 (series)	NOTE Harmonized as EN 60721-2 (series).
IEC 60721-3 (series)	NOTE Harmonized as EN 60721-3 (series).
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IEC 61850 (series)	NOTE Harmonized as EN 61850 (series).
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IEC 60695-7 (series)	NOTE Harmonized as EN 60695-7 (series).
IEC 60068-2-17:1994	NOTE Harmonized as EN 60068-2-17:1994.
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IEC 60909-0	NOTE Harmonized as EN 60909-0.
IEC 60228	NOTE Harmonized as EN 60228.
IEC 60445	NOTE Harmonized as EN 60445.
IEC 60947-7-1	NOTE Harmonized as EN 60947-7-1.
IEC 60947-7-2	NOTE Harmonized as EN 60947-7-2.
IEC 61810 (series)	NOTE Harmonized as EN 61810 (series).
IEC 61810-1	NOTE Harmonized as EN 61810-1.
IEC 61810-2	NOTE Harmonized as EN 61810-2.
IEC 60947-4-1	NOTE Harmonized as EN 60947-4-1.
IEC 60947-2	NOTE Harmonized as EN 60947-2.
IEC 60947-4-2	NOTE Harmonized as EN 60947-4-2.
IEC 60947-3	NOTE Harmonized as EN 60947-3.
IEC 60947-5-1	NOTE Harmonized as EN 60947-5-1.
IEC 60730-2-13	NOTE Harmonized as EN 60730-2-13.
IEC 60669-1	NOTE Harmonized as EN 60669-1.
IEC 60730-2-9	NOTE Harmonized as EN 60730-2-9.
IEC 61020-1	NOTE Harmonized as EN 61020-1.
IEC 60269-1	NOTE Harmonized as EN 60269-1.
IEC 60269-2	NOTE Harmonized as EN 60269-2.
IEC 60034-1	NOTE Harmonized as EN 60034-1.
IEC 60051-1	NOTE Harmonized as EN 60051-1.
IEC 60051-2	NOTE Harmonized as EN 60051-2.

IEC 60051-4	NOTE Harmonized as EN 60051-4.
IEC 60051-5	NOTE Harmonized as EN 60051-5.
IEC 60309-1	NOTE Harmonized as EN 60309-1.
IEC 60309-2	NOTE Harmonized as EN 60309-2.
IEC 60130 (series)	NOTE Harmonized as EN 60130 (series).
IEC 62326-1	NOTE Harmonized as EN 62326-1.
IEC 60393-1	NOTE Harmonized as EN 60393-1.
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IEC 60064	NOTE Harmonized as EN 60064.
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INTERNATIONAL STANDARD

NORME INTERNATIONALE



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

**Appareillage à haute tension –
Partie 1: Spécifications communes pour appareillage à courant alternatif**



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CONTENTS

FOREWORD.....	9
AMENDMENT A1 FOREWORD A1.....	12
INTRODUCTION.....	13
1 Scope.....	14
2 Normative references	14
3 Terms and definitions	16
3.1 General terms and definitions	17
3.2 Assemblies of switchgear and controlgear	20
3.3 Parts of assemblies	20
3.4 Switching devices	20
3.5 Parts of switchgear and controlgear	20
3.6 Operational characteristics of switchgear and controlgear	24
3.6.5 Terms and definitions relative to pressure (or density)	25
3.6.6 Terms and definitions relating to gas and vacuum tightness	25
3.6.7 Terms and definitions relating to liquid tightness	27
3.7 Characteristic quantities	27
3.8 Index of definitions.....	28
4 Normal and special service conditions	30
4.1 Normal service conditions	30
4.1.1 General	30
4.1.2 Indoor switchgear and controlgear	30
4.1.3 Outdoor switchgear and controlgear	31
4.2 Special service conditions.....	31
4.2.1 General	31
4.2.2 Altitude	32
4.2.3 Exposure to pollution	32
4.2.4 Temperature and humidity	32
4.2.5 Exposure to abnormal vibrations, shock or tilting	32
4.2.6 Wind speed	33
4.2.7 Other parameters	33
5 Ratings.....	33
5.1 General.....	33
5.2 Rated voltage (U_r)	34
5.2.1 General	34
5.2.2 Range I for rated voltages of 245 kV and below	34
5.2.3 Range II for rated voltages above 245 kV	34
5.3 Rated insulation level (U_d , U_p , U_s).....	34
5.4 Rated frequency (f_r)	38
5.5 Rated continuous current (I_r)	38
5.6 Rated short-time withstand current (I_k)	38
5.7 Rated peak withstand current (I_p)	39
5.8 Rated duration of short-circuit (t_k).....	39
5.9 Rated supply voltage of auxiliary and control circuits (U_a)	39

5.9.1	General	39
5.9.2	Rated supply voltage (U_a)	40
5.10	Rated supply frequency of auxiliary and control circuits	40
5.11	Rated pressure of compressed gas supply for controlled pressure systems	40
6	Design and construction	41
6.1	Requirements for liquids in switchgear and controlgear	41
6.2	Requirements for gases in switchgear and controlgear	41
6.3	Earthing of switchgear and controlgear	41
6.4	Auxiliary and control equipment and circuits	41
6.4.1	General	41
6.4.2	Protection against electric shock	42
6.4.3	Components installed in enclosures	43
6.5	Dependent power operation	46
6.6	Stored energy operation	46
6.6.1	General	46
6.6.2	Energy storage in gas receivers or hydraulic accumulators	46
6.6.3	Energy storage in springs (or weights)	46
6.6.4	Manual charging	46
6.6.5	Motor charging	47
6.6.6	Energy storage in capacitors	47
6.7	Independent unlatched operation (independent manual or power operation)	47
6.8	Manually operated actuators	47
6.9	Operation of releases	47
6.9.1	General	47
6.9.2	Shunt closing release	48
6.9.3	Shunt opening release	48
6.9.4	Capacitor operation of shunt releases	48
6.9.5	Under-voltage release	48
6.10	Pressure/level indication	48
6.10.1	Gas pressure	48
6.10.2	Liquid level	48
6.11	Nameplates	49
6.11.1	General	49
6.11.2	Application	49
6.12	Locking devices	51
6.13	Position indication	51
6.14	Degrees of protection provided by enclosures	51
6.14.1	General	51
6.14.2	Protection of persons against access to hazardous parts and protection of the equipment against ingress of solid foreign objects (IP coding)	51
6.14.3	Protection against ingress of water (IP coding)	51
6.14.4	Protection against mechanical impact under normal service conditions (IK coding)	51
6.15	Creepage distances for outdoor insulators	52
6.16	Gas and vacuum tightness	52
6.16.1	General	52
6.16.2	Controlled pressure systems for gas	52
6.16.3	Closed pressure systems for gas	52
6.16.4	Sealed pressure systems	53

6.17	Tightness for liquid systems	53
6.17.1	General	53
6.17.2	Leakage rates	53
6.18	Fire hazard (flammability)	53
6.19	Electromagnetic compatibility (EMC)	53
6.20	X-ray emission	54
6.21	Corrosion	54
6.22	Filling levels for insulation, switching and/or operation	54
7	Type tests	54
7.1	General	54
7.1.1	Basics	54
7.1.2	Information for identification of test objects	54
7.1.3	Information to be included in type-test reports	55
7.2	Dielectric tests	55
7.2.1	General	55
7.2.2	Ambient air conditions during tests	55
7.2.3	Wet test procedure	56
7.2.4	Arrangement of the equipment	56
7.2.5	Criteria to pass the test	57
7.2.6	Application of the test voltage and test conditions	57
7.2.7	Tests of switchgear and controlgear of $U_r \leq 245$ kV	61
7.2.8	Tests of switchgear and controlgear of $U_r > 245$ kV	61
7.2.9	Artificial pollution tests for outdoor insulators	62
7.2.10	Partial discharge tests	62
7.2.11	Dielectric tests on auxiliary and control circuits	62
7.2.12	Voltage test as condition check	62
7.3	Radio interference voltage (RIV) test	63
7.4	Resistance measurement	63
7.4.1	Measurement of the resistance of auxiliary contacts class 1 and class 2	63
7.4.2	Measurement of the resistance of auxiliary contacts class 3	63
7.4.3	Electrical continuity of earthed metallic parts test	63
7.4.4	Resistance measurement of contacts and connections in the main circuit as a condition check	64
7.5	Continuous current tests	65
7.5.1	Condition of the test object	65
7.5.2	Arrangement of the equipment	65
7.5.3	Test current and duration	65
7.5.4	Temperature measurement during test	66
7.5.5	Resistance of the main circuit	67
7.5.6	Criteria to pass test	68
7.6	Short-time withstand current and peak withstand current tests	72
7.6.1	General	72
7.6.2	Arrangement of the equipment and of the test circuit	72
7.6.3	Test current and duration	73
7.6.4	Conditions of the test object after test	73
7.7	Verification of the protection	74
7.7.1	Verification of the IP coding	74
7.7.2	Verification of the IK coding	74

7.8	Tightness tests	74
7.8.1	General	74
7.8.2	Controlled pressure systems for gas	75
7.8.3	Closed pressure systems for gas	76
7.8.4	Sealed pressure systems	76
7.8.5	Liquid tightness tests	77
7.9	Electromagnetic compatibility tests (EMC)	77
7.9.1	Emission tests	77
7.9.2	Immunity tests on auxiliary and control circuits	79
7.9.3	Additional EMC tests on auxiliary and control circuits	82
7.10	Additional tests on auxiliary and control circuits	82
7.10.1	General	82
7.10.2	Functional tests	82
7.10.3	Verification of the operational characteristics of auxiliary contacts	82
7.10.4	Environmental tests	83
7.10.5	Dielectric test	84
7.11	X-radiation test for vacuum interrupters	85
7.11.1	General requirements	85
7.11.2	Test voltage and measurement procedure	86
7.11.3	Acceptance criteria	86
8	Routine tests	87
8.1	General	87
8.2	Dielectric test on the main circuit	87
8.3	Tests on auxiliary and control circuits	87
8.3.1	Inspection of auxiliary and control circuits, and verification of conformity to the circuit diagrams and wiring diagrams	87
8.3.2	Functional tests	88
8.3.3	Verification of protection against electrical shock	88
8.3.4	Dielectric tests	88
8.4	Measurement of the resistance of the main circuit	88
8.5	Tightness test	89
8.5.1	General	89
8.5.2	Controlled pressure systems for gas	89
8.5.3	Closed pressure systems for gas	89
8.5.4	Sealed pressure systems	89
8.5.5	Liquid tightness tests	89
8.6	Design and visual checks	89
9	Guide to the selection of switchgear and controlgear (informative)	90
9.1	General	90
9.2	Selection of rated values	90
9.3	Cable-interface considerations	90
9.4	Continuous or temporary overload due to changed service conditions	90
9.5	Environmental aspects	90
9.5.1	Service conditions	90
9.5.2	Clearances affected by service conditions	90
9.5.3	High humidity	90
9.5.4	Solar radiation	91
10	Information to be given with enquiries, tenders and orders (informative)	91

10.1	General.....	91
10.2	Information with enquiries and orders	91
10.3	Information with tenders.....	92
11	Transport, storage, installation, operating instructions and maintenance	93
11.1	General.....	93
11.2	Conditions during transport, storage and installation	93
11.3	Installation	93
11.3.1	General	93
11.3.2	Unpacking and lifting	93
11.3.3	Assembly.....	94
11.3.4	Mounting	94
11.3.5	Connections	94
11.3.6	Information about gas and gas mixtures for controlled and closed pressure systems	94
11.3.7	Final installation inspection.....	95
11.3.8	Basic input data by the user	95
11.3.9	Basic input data by the manufacturer	95
11.4	Operating instructions	96
11.5	Maintenance	96
11.5.1	General	96
11.5.2	Information about fluids and gas to be included in maintenance manual	96
11.5.3	Recommendations for the manufacturer.....	96
11.5.4	Recommendations for the user	97
11.5.5	Failure report.....	98
12	Safety.....	99
12.1	General.....	99
12.2	Precautions by manufacturers.....	100
12.3	Precautions by users	100
13	Influence of the product on the environment	100
Annex A (normative)	Identification of test objects	102
A.1	General.....	102
A.2	Data.....	102
A.3	Drawings.....	102
Annex B (informative)	Determination of the equivalent RMS value of a short-time current during a short-circuit of a given duration	104
Annex C (normative)	Method for the weatherproofing test for outdoor switchgear and controlgear	105
Annex D (informative)	References for auxiliary and control circuit components	108
Annex E (normative)	Tolerances on test quantities during tests	110
Annex F (informative)	Information and technical requirements to be given with enquiries, tenders and orders	113
F.1	General.....	113
F.2	Normal and special service conditions (refer to Clause 4)	113
F.3	Ratings (refer to Clause 5)	114
F.4	Design and construction (refer to Clause 6)	114
F.5	System information	115
F.6	Documentation for enquiries and tenders	115
Annex G (informative)	List of symbols	116

Annex H (informative) Electromagnetic compatibility on site	118
Annex I (informative) List of notes concerning certain countries	119
Annex J (informative) Extension of validity of type tests	120
J.1 General.....	120
J.2 Dielectric tests	120
J.3 Short-time withstand current tests	120
J.4 Continuous current test	120
J.5 Electromagnetic immunity test on auxiliary and control circuits	121
J.6 Environmental tests on auxiliary and control circuits	121
Annex K (informative) Exposure to pollution.....	122
K.1 General.....	122
K.2 Pollution levels	122
K.3 Minimum requirements for switchgear	122
Annex ZA (normative) Normative references to international publications with their corresponding European publications	124
Bibliography.....	127
Figure 1 – Examples of classes of contacts.....	45
Figure 2 – Diagram of connections of a three-pole switching device.....	58
Figure 3 – Diagram of a test circuit for the radio interference voltage test	78
Figure 4 – Test location of radiation survey instrument	86
Figure B.1 – Determination of short-time current.....	104
Figure C.1 – Arrangement for weatherproofing test	106
Figure C.2 – Nozzle for weatherproofing test	107
Table 1 – Rated insulation levels for rated voltages of range I, series I	35
Table 2 – Rated insulation levels for rated voltages of range I, series II (based on current practice in some countries, including US)	36
Table 3 – Rated insulation levels for rated voltages of range II	37
Table 4 – Additional rated insulation levels for range II, based on current practice in some countries, including US.....	38
Table 5 – Peak factors for rated peak withstand current.....	39
Table 6 – Direct current voltage	40
Table 7 – Alternating current voltage	40
Table 8 – Auxiliary contact classes	45
Table 9 – Nameplate information	50
Table 10 – Test conditions in general case	58
Table 11 – Power-frequency test conditions	59
Table 12 – Impulse test conditions	60
Table 13 – Test conditions for the alternative method	60
Table 14 – Limits of temperature and temperature rise for various parts, materials and dielectrics of high-voltage switchgear and controlgear	68
Table 15 – Permissible leakage rates for gas systems	75
Table 16 – Application of voltages at the fast transient/burst test	80
Table 17 – Application of voltage at the damped oscillatory wave test.....	81

Table 18 – Assessment criteria for transient disturbance immunity	81
Table D.1 – List of reference documents for auxiliary and control circuit components	108
Table E.1 – Tolerances on test quantities for type test	110
Table K.1 – Environmental examples by site pollution severity (SPS) class	123
Table K.2 – Minimum nominal specific creepage distance by pollution level	123

INTERNATIONAL ELECTROTECHNICAL COMMISSION

HIGH-VOLTAGE SWITCHGEAR AND CONTROLGEAR –

Part 1: Common specifications for alternating current switchgear and controlgear

FOREWORD

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International Standard IEC 62271-1 has been prepared by technical committee 17: High-voltage switchgear and controlgear.

This second edition cancels and replaces the first edition published in 2007 and Amendment 1:2011. This edition constitutes a technical revision.

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

New numbering in accordance with ISO/IEC directives, Part 2 (2016) and IEEE Std. C37.100.1.

- 4.1.2 a) The normal service condition for indoor switchgear is limited to one range of 40 °C to – 5 °C.
- 4.1.3 a) The normal service condition for outdoor switchgear is limited to one range of 40 °C to –25 °C.

- 4.2.2: The specifications from IEC 60071-2:1996 are adopted for altitude correction factors above 1 000 m.
- 5.2.2: Range I, the rated voltage of 40,5 kV is added Series I Table 1; Table 2 and Table 4 are updated on recommendation of the US National Committee.
- 6.8: New subclause added for manual operated actuators consistent with “Man Machine Interface” recommendations of IEC 60447 [1] ².
- 7.2.6.1: Insert the wording regarding preliminary impulses across open vacuum interrupters according to the result of IEC 17/1026/RQ.
- 7.3: Changed the requirement for radio interference voltage to a rated voltage level of 245 kV and above, instead of 123 kV and above. This change is based on reported positive test and service experience of utility representatives in the maintenance team of this standard.
- 7.5.6, Table 14:
- a) Introduced the distinction of parts in “OG” (oxidizing gas) or in “NOG” (not oxidizing gas) replacing the former “air” and “SF₆”;
 - b) Increased the allowable temperature rise for some parts in groups 1 and 2 of Table 14 according to IEC TR 60943 [2];
 - c) Expanded the definition of allowable temperature rise for categories of accessible surfaces with reference to IEC Guide 117 [3]. See also point 15 in 7.5.6.2.
- 7.5.6.2: Point 5 is modified to clarify the introduction of “OG” and “NOG” gas.
- 7.10: Some tests were removed because the relevant test standards of IEC 60068 series were modified or withdrawn.
- 7.11.3: The acceptance criteria for X-radiation testing are modified to recognize higher rated vacuum interrupters.

Former informative Annex H: Corrosion is deleted, the content is part of IEC TR 62271-306 [4].

New Annex J (informative): Added informative guidelines for the extension of validity of type tests

New Annex K (informative): Added informative guidelines about exposure to pollution

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

FDIS	Report on voting
17/1033/FDIS	17/1037/RVD

Full information on the voting for the approval of this International Standard can be found in the report on voting indicated in the above table.

This document has been drafted in accordance with the ISO/IEC Directives, Part 2.

The reader’s attention is drawn to the fact that Annex I lists all of the “in-some-country” clauses on differing practices of a less permanent nature relating to the subject of this standard.

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.

² Numbers in square brackets refer to the Bibliography.

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.

The contents of the Interpretation Sheet 1 of May 2021 have been included in this copy.

A1 AMENDMENT A1 FOREWORD

Amendment 1 to IEC 62271-1:2017 has been prepared by IEC technical committee 17: High-voltage switchgear and controlgear.

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

FDIS	Report on voting
17/1106/FDIS	17/1112/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 Amendment 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/.

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- reconfirmed,
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- amended.

INTRODUCTION

In the preparation of this FDIS draft for the general revision of IEC 62271-1:2007 and IEC 62271-1:2007/AMD1:2011, the maintenance team was motivated by the following principles:

- Application of horizontal standards – such application is mandatory for product standards, (reference IEC Guide 108 [5]). A typical example is the application of IEC 60071 (all parts) dealing with insulation coordination.
- Application of the "principle of verifiability" – as defined in the Directives, Part 2, 5.5 (2016) "...Only those requirements which can be verified shall be included."
- Organizing information in the proper clause, e.g. terms and definitions in Clause 3, rated values in Clause 5. For example, the values of rated continuous current are specified in Clause 5 but the conditions of test and acceptance criteria (e.g. temperature rise limits) are moved to Clause 7.
- Normal service conditions in Clause 4 are unambiguous statements of conditions under which the switchgear and controlgear is expected to operate. For example: "Solar radiation does not exceed a level of 1 000 W/m²" rather than "Solar radiation up to a level of 1 000 W/m² should be considered".
- Ratings in Clause 5 have been limited to reflect the common specifications of the switchgear and controlgear that are specified by the user and are necessary for operation on the user's network. See the last paragraph of 5.1 for addition clarification.
- Statements or informative NOTES that reflect design guides (not requirements) or application (not standard requirements) are either removed or moved to Clause 9.
For example, the following former NOTE contains both a design guide and an application issue, neither of which belongs to normal service conditions:
"Under certain levels of solar radiation, appropriate measures, for example roofing, forced ventilation, test simulating solar gain, etc., may be necessary, or derating may be used, in order not to exceed the specified temperature rises and pressure rise limits".
- Specifications for design and construction in Clause 6 have been limited to requirements that can be verified by test or inspection.
- References to tests and procedures that relate to transportation, installation, commissioning and maintenance have been moved to Clause 11.
- Improve wording to minimize the possibility of miss-interpretation or conflicting interpretations of the specifications, methods or criteria.
- Elimination of hanging paragraphs and actual or potential circular references. Reference to ISO/IEC Directives, Part 2, 22.3.3 (2016).

As a result of the application of these principles or objectives, the FDIS draft includes more revisions that might otherwise be expected.

HIGH-VOLTAGE SWITCHGEAR AND CONTROLGEAR –

Part 1: Common specifications for alternating current switchgear and controlgear

1 Scope

This part of IEC 62271 applies to AC switchgear and controlgear designed for indoor and/or outdoor installation and for operation at service frequencies up to and including 60 Hz and having rated voltages above 1 000 V.

This document applies to all high-voltage switchgear and controlgear except as otherwise specified in the relevant IEC standards for the particular type of switchgear and controlgear.

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

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 60050-131:2002, *International Electrotechnical Vocabulary (IEV) – Part 131: Circuit theory*

IEC 60050-151:2001, *International Electrotechnical Vocabulary (IEV) – Part 151: Electrical and magnetic devices*

IEC 60050-192:2015, *International Electrotechnical Vocabulary (IEV) – Part 192: Dependability*

IEC 60050-351, *International Electrotechnical Vocabulary (IEV) – Part 351: Control technology*

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

IEC 60050-441:1984/AMD1:2000

IEC 60050-551, *International Electrotechnical Vocabulary (IEV) – Part 551: Power electronics*

IEC 60050-581:2008, *International Electrotechnical Vocabulary (IEV) – Part 581: Electromechanical components for electronic equipment*

IEC 60050-601, *International Electrotechnical Vocabulary (IEV) – Chapter 601: Generation, transmission and distribution of electricity – General*

IEC 60050-605, *International Electrotechnical Vocabulary (IEV) – Chapter 605: Generation, transmission and distribution of electricity – Substations*

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 60050-826:2004, *International Electrotechnical Vocabulary (IEV) – Part 826: Electrical installations*

IEC 60060-1:2010, *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 60068-2-30:2005, *Environmental testing – Part 2-30: Tests – Test Db: Damp heat, cyclic (12 h + 12 h cycle)*

IEC 60071-1:2006, *Insulation co-ordination – Part 1: Definitions, principles and rules*
IEC 60071-1:2006/AMD1:2010

IEC 60071-2:1996, *Insulation co-ordination – Part 2: Application guide*

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 – Unused mineral insulating oils for transformers and switchgear*

IEC 60376, *Specification of technical grade sulphur hexafluoride (SF₆) for use in electrical equipment*

IEC 60480, *Guidelines for the checking and treatment of sulphur hexafluoride (SF₆) taken from electrical equipment and specification for its re-use*

IEC 60507, *Artificial pollution tests on high-voltage ceramic and glass insulators to be used on a.c. systems*

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 TS 60815-1:2008, *Selection and dimensioning of high-voltage insulators intended for use in polluted conditions – Part 1: Definitions, information and general principles*

IEC TS 60815-2:2008, *Selection and dimensioning of high-voltage insulators intended for use in polluted conditions – Part 2: Ceramic and glass insulators for a.c. systems*

IEC TS 60815-3:2008, *Selection and dimensioning of high-voltage insulators intended for use in polluted conditions – Part 3: Polymer insulators for a.c. 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*

IEC 61000-4-17:2009, *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 d.c. input power port immunity tests*

IEC 61000-6-2, *Electromagnetic compatibility (EMC) – Part 6-2: Generic standards – Immunity 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 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 62271-4, *High-voltage switchgear and controlgear – Part 4: Handling procedures for sulphur hexafluoride (SF₆) and its mixtures*

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

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*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 60050-131, IEC 60050-151, IEC 60050-192, IEC 60050-351, IEC 60050-441, IEC 60050-551, IEC 60050-581, IEC 60050-601, IEC 60050-605, IEC 60050-614, IEC 60050-811 and IEC 60050-826, some of which are recalled hereunder, and 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>