

INTERNATIONAL STANDARD



This extended version of IEC 62271-214:2024 includes the content of the references made to IEC 62271-1:2017+AMD1:2021 CSV

**High-voltage switchgear and controlgear –
Part 214: Internal arc classification for AC metal-enclosed pole-mounted
switchgear and controlgear for rated voltages above 1 kV and up to and
including 52 kV**

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CONTENTS

FOREWORD.....	6
INTRODUCTION.....	8
INTRODUCTION to IEC 62271-214:2024.....	8
1 Scope.....	9
2 Normative references	9
3 Terms and definitions	12
3.1 General terms and definitions	12
3.2 Assemblies of switchgear and controlgear	17
3.3 Parts of assemblies	17
3.4 Switching devices	18
3.5 Parts of switchgear and controlgear	18
3.6 Operational characteristics of switchgear and controlgear.....	21
3.6.5 Terms and definitions relative to pressure (or density).....	22
3.6.6 Terms and definitions relating to gas and vacuum tightness	23
3.6.7 Terms and definitions relating to liquid tightness.....	24
3.7 Characteristic quantities	25
3.8 Index of definitions.....	26
4 Normal and special service conditions	28
5 Ratings.....	28
5.1 General.....	28
5.2 Rated voltage (U_r)	28
5.2.1 General	28
5.2.2 Range I for rated voltages of 245 kV and below	29
5.2.3 Range II for rated voltages above 245 kV	29
5.3 Rated insulation level (U_d , U_p , U_s).....	29
5.4 Rated frequency (f_r).....	29
5.5 Rated continuous current (I_r).....	29
5.6 Rated short-time withstand current (I_k)	29
5.7 Rated peak withstand current (I_p)	29
5.8 Rated duration of short-circuit (t_k).....	29
5.9 Rated supply voltage of auxiliary and control circuits (U_a)	29
5.10 Rated supply frequency of auxiliary and control circuits	29
5.11 Rated pressure of compressed gas supply for controlled pressure systems	29
5.101 Ratings of the internal arc classification (IAC).....	30
5.101.1 General	30
5.101.2 Rated approach distance (D_{AP}).....	30
5.101.3 Rated arc fault currents (I_A , I_{Ae})	30
5.101.4 Rated arc fault duration (t_A , t_{Ae})	30
6 Design and construction	30
6.1 Requirements for liquids in switchgear and controlgear.....	30
6.2 Requirements for gases in switchgear and controlgear	30
6.3 Earthing of switchgear and controlgear	30
6.4 Auxiliary and control equipment and circuits	31
6.5 Dependent power operation	31
6.6 Stored energy operation.....	31
6.7 Independent unlatched operation (independent manual or power operation)	31

6.8	Manually operated actuators	31
6.9	Operation of releases.....	31
6.10	Pressure/level indication	31
6.11	Nameplates.....	31
6.11.1	General	31
6.11.2	Application.....	31
6.12	Locking devices	32
6.13	Position indication.....	32
6.14	Degrees of protection provided by enclosures.....	32
6.15	Creepage distances for outdoor insulators	32
6.16	Gas and vacuum tightness	32
6.17	Tightness for liquid systems.....	32
6.18	Fire hazard (flammability)	33
6.19	Electromagnetic compatibility (EMC).....	33
6.20	X-ray emission	33
6.21	Corrosion.....	33
6.22	Filling levels for insulation, switching and/or operation.....	33
6.101	Internal arc fault.....	33
6.102	Enclosure	33
7	Type tests	34
7.1	General.....	34
7.1.1	Basics	34
7.1.2	Information for identification of test objects.....	35
7.1.3	Information to be included in type-test reports	35
7.2	Dielectric tests	36
7.3	Radio interference voltage (RIV) test	37
7.4	Resistance measurement.....	37
7.5	Continuous current tests.....	37
7.6	Short-time withstand current and peak withstand current tests.....	37
7.7	Verification of the protection	37
7.8	Tightness tests	37
7.9	Electromagnetic compatibility tests (EMC)	37
7.10	Additional tests on auxiliary and control circuits	37
7.11	X-radiation test for vacuum interrupters	37
7.101	Internal arc type test.....	37
7.101.1	General	37
7.101.2	Test conditions	37
7.101.3	Arrangement of the equipment.....	38
7.101.4	Indicators (for assessing the thermal effects of the gases).....	40
7.101.5	Arrangement of indicators.....	40
7.101.6	Test parameters	41
7.101.7	Test procedure	42
7.101.8	Criteria to pass the test	47
7.101.9	Transferability of the test results.....	48
8	Routine tests	48
9	Guide to the selection of switchgear and controlgear (informative)	48
9.1	General.....	48
9.2	Selection of rated values.....	48
9.3	Cable-interface considerations.....	48

9.4	Continuous or temporary overload due to changed service conditions.....	48
9.5	Environmental aspects.....	48
9.101	Internal arc fault.....	48
9.101.1	General.....	48
9.101.2	Causes and preventive measures.....	49
9.101.3	Supplementary protective measures.....	50
9.101.4	Considerations for the selection and installation.....	51
9.101.5	Internal arc test.....	51
9.101.6	IAC designation.....	51
10	Information to be given with enquiries, tenders and orders (informative).....	52
10.1	General.....	52
10.2	Information with enquiries and orders.....	52
10.3	Information with tenders.....	52
11	Transport, storage, installation, operating instructions and maintenance.....	52
11.1	General.....	52
11.2	Conditions during transport, storage and installation.....	52
11.3	Installation.....	53
11.3.1	General.....	53
11.3.2	Unpacking and lifting.....	53
11.3.3	Assembly.....	53
11.3.4	Mounting.....	53
11.3.5	Connections.....	53
11.3.6	Information about gas and gas mixtures for controlled and closed pressure systems.....	53
11.3.7	Final installation inspection.....	53
11.3.8	Basic input data by the user.....	53
11.3.9	Basic input data by the manufacturer.....	53
11.4	Operating instructions.....	53
11.5	Maintenance.....	53
11.101	Maintenance.....	53
12	Safety.....	54
12.1	General.....	54
12.2	Precautions by manufacturers.....	54
12.3	Precautions by users.....	54
13	Influence of the product on the environment.....	54
Annex A (normative)	Identification of test objects.....	55
A.1	General.....	55
A.2	Data.....	55
A.3	Drawings.....	55
Annex B (informative)	Determination of the equivalent RMS value of a short-time current during a short-circuit of a given duration.....	57
Annex C (normative)	Method for the weatherproofing test for outdoor switchgear and controlgear.....	58
Annex D (informative)	References for auxiliary and control circuit components.....	61
Annex E (normative)	Tolerances on test quantities during tests.....	63
Annex F (informative)	Information and technical requirements to be given with enquiries, tenders and orders.....	66
F.1	General.....	66

F.2	Normal and special service conditions (refer to Clause 4)	66
F.3	Ratings (refer to Clause 5)	67
F.4	Design and construction (refer to Clause 6)	67
F.5	System information	68
F.6	Documentation for enquiries and tenders	68
Annex G (informative)	List of symbols	69
Annex H (informative)	Electromagnetic compatibility on site	70
Annex I (informative)	List of notes concerning certain countries	71
Annex J (informative)	Extension of validity of type tests	72
J.1	General	72
J.2	Dielectric tests	72
J.3	Short-time withstand current tests	72
J.4	Continuous current test	72
J.5	Electromagnetic immunity test on auxiliary and control circuits	73
J.6	Environmental tests on auxiliary and control circuits	73
Annex K (informative)	Exposure to pollution	74
K.1	General	74
K.2	Pollution levels	74
K.3	Minimum requirements for switchgear	74
Bibliography		76
Figure 1	Examples of enclosures and compartment(s) in different arrangements	34
Figure 2	Test arrangement for pole-mounted switchgear and controlgear	39
Figure 3	Horizontal indicator	40
Figure 4	Flow-chart for the choice of arc initiation depending on the construction	45
Figure B.1	Determination of short-time current	57
Figure C.1	Arrangement for weatherproofing test	59
Figure C.2	Nozzle for weatherproofing test	60
Table 9	Nameplate information	32
Table 1	Nameplate information	32
Table 2	Parameters for internal arc fault test according to enclosure and compartment construction	44
Table 3	Locations, causes and examples of measures to decrease the probability of internal arc faults	50
Table 4	Single-phase-to-earth arc fault current depending on the network neutral earthing	52
Table D.1	List of reference documents for auxiliary and control circuit components (1 of 2)	61
Table E.1	Tolerances on test quantities for type test	64
Table K.1	Environmental examples by site pollution severity (SPS) class	75
Table K.2	Minimum nominal specific creepage distance by pollution level	75

INTERNATIONAL ELECTROTECHNICAL COMMISSION

HIGH-VOLTAGE SWITCHGEAR AND CONTROLGEAR –

Part 214: Internal arc classification for AC metal-enclosed pole-mounted switchgear and controlgear for rated voltages above 1 kV and up to and including 52 kV

FOREWORD

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This extended version (EXV) of the official IEC Standard provides the user with the comprehensive content of the Standard.

IEC 62271-214:2024 EXV includes the content of IEC 62271-214:2024, and the references made to IEC 62271-1:2017+AMD1:2021 CSV.

The specific content of IEC 62271-214:2024 is displayed on a [blue background](#).

IEC 62271-214 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 2019. This edition constitutes a technical revision.

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

- a) indicators positioning update;
- b) neutral earthing connection of the test circuit for three-phase tests;
- c) general review for consistency with IEC 62271-200, Ed.3.0:2021.

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

Draft	Report on voting
17C/924/FDIS	17C/931/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/publications.

This standard shall be read in conjunction with IEC 62271-1, second edition, published in 2017, to which it refers, and which is applicable unless otherwise specified in this standard. 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 references whilst additional subclauses are numbered from 101. Any clause with the term "Not applicable" relates to the clause not being relevant to IEC 62271-214, and does not infer the clause is or is not relevant for its applicable switchgear standard.

A list of all parts of the IEC 62271 series, published 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 webstore.iec.ch in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn, or
- revised.

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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.

INTRODUCTION to IEC 62271-214:2024

IEC 62271-214 has been developed due to the requirement to remove IAC Type C designated pole-mounted switchgear from IEC 62271-200. IEC 62271-214 is to be considered independent of IEC 62271-200, however it is still related to other product standards of the IEC 62271 series.

Only open terminal pole-mounted switchgear and controlgear has been considered within this document.

This equipment relates to operation in three-phase, two-phase and single-phase systems.

HIGH-VOLTAGE SWITCHGEAR AND CONTROLGEAR –

Part 214: Internal arc classification for AC metal-enclosed pole-mounted switchgear and controlgear for rated voltages above 1 kV and up to and including 52 kV

1 Scope

This part of IEC 62271 specifies requirements for internal arc classification of AC metal-enclosed pole-mounted switchgear and controlgear with rated voltages above 1 kV and up to and including 52 kV with service frequencies up to and including 60 Hz.

This document is applicable to three-phase, two-phase and single-phase open terminal equipment for which an internal arc classification is assigned. Enclosures may include fixed and removable components and may be filled with fluid (liquid or gas) to provide insulation.

NOTE 1 The IAC classification takes into account the installation disposition of the high-voltage switchgear and controlgear and worker's operating area.

NOTE 2 For the use of this document, high-voltage (IEC 60050-601:1985, 601-01-27) is the rated voltage above 1 000 V. However, medium voltage (IEC 60050-601:1985, 601-01-28) is commonly used for distribution systems with voltages above 1 kV and generally applied up to and including 52 kV; refer to [1]¹.

This document does not preclude that other equipment may be included in the same enclosure. In such a case, any possible influence of that equipment on the switchgear and controlgear is to be taken into account.

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 60050-151:2001/AMD1:2013

IEC 60050-151:2001/AMD2:2014

IEC 60050-151:2001/AMD3:2019

IEC 60050-151:2001/AMD4:2020

IEC 60050-151:2001/AMD5:2021

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

¹ Numbers in square brackets refer to the Bibliography.

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*

<https://standards.iteh.ai/IEC/60068-2-2:2007/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 62271-1:2017, *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 sulphur hexafluoride (SF₆) and its mixtures*

IEC 62271-200:2021, *High-voltage switchgear and controlgear – Part 200: AC metal-enclosed switchgear and controlgear for rated voltages above 1 kV and up to and including 52 kV*

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 62271-1, IEC 60050-151 and IEC 60050-441, as well as the following apply.

NOTE 1 The classification system for definitions of IEC 62271-1:2017 is not followed. Terms and definitions are referenced and prioritized in the following order:

- Clause 3 of this document;
- IEC 62271-1:2017;
- IEC 60050-441;
- IEC 60050-151.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- IEC Electropedia: available at <https://www.electropedia.org/>
- ISO Online browsing platform: available at <https://www.iso.org/obp>

NOTE 2 Additional definitions are classified so as to be aligned with the classification system used in IEC 60050-441.

3.1 General terms and definitions

3.1.1

switchgear and controlgear

general term covering switching devices and their combination with associated control, measuring, protective and regulating equipment, also assemblies of such devices and equipment with associated interconnections, accessories, enclosures and supporting structures

[SOURCE: IEC 60050-441:2000, 441-11-01]

3.1.2

external insulation

distances in atmospheric air and along the surfaces in contact with atmospheric air of solid insulation of the equipment which are subject to dielectric stresses and to the effects of atmospheric and other environmental conditions from the site

Note 1 to entry: Examples of environmental conditions are pollution, humidity, vermin, etc.

[SOURCE: IEC 60050-614:2016, 614-03-02]

3.1.3

degree of protection

extent of protection provided by an enclosure against access to hazardous parts, against ingress of solid foreign objects and/or ingress of water and against mechanical impact