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Title: BS EN IEC 62271-205 High-voltage switchgear and controlgear

Part 205: Compact switchgear assemblies for rated voltages above 52 kV

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Introduction

This draft standard is based on national and international discussions. Your comments on this draft are invited and will assist in the preparation of the consequent standard.

For international standards, comments will be reviewed by the relevant UK national committee before sending the consensus UK vote and comments to the international committee, which will then decide appropriate action. If the international standard is approved, it is usual for the text to be published as a British Standard.

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Template for comments and secretariat observations

Date: xx/xx/20xx	Document: ISO/DIS xxxx
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1	2	(3)	4	5	(6)	7
MB	Clause No./ Subclause No./Annex (e.g. 3.1)	Paragraph/Figure/ Table/Note	Type of comment	Commend (justification for change) by the MB	Proposed change by the MB	Secretariat observations on each comment submitted
	3.1	Definition 1	ed	Definition is ambiguous and needs clarifying.	Amend to read '...so that the mains connector to which no connection...'	
	6.4	Paragraph 2	te	The use of the UV photometer as an alternative cannot be supported as serious problems have been encountered in its use in the UK.	Delete reference to UV photometer.	



17C/934/CD

COMMITTEE DRAFT (CD)

PROJECT NUMBER: IEC 62271-205 ED2	
DATE OF CIRCULATION: 2024-04-12	CLOSING DATE FOR COMMENTS: 2024-07-05
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IEC SC 17C : ASSEMBLIES	
SECRETARIAT: Germany	SECRETARY: Mr Mark Kuschel
OF INTEREST TO THE FOLLOWING COMMITTEES: SC 17A,TC 28,TC 36,TC 57,TC 99	PROPOSED HORIZONTAL STANDARD: ☐ Other TC/SCs are requested to indicate their interest, if any, in this CD to the secretary.
FUNCTIONS CONCERNED: ☒ EMC ☐ ENVIRONMENT ☐ QUALITY ASSURANCE ☒ SAFETY	

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TITLE: High-voltage switchgear and controlgear - Part 205: Compact switchgear assemblies, mobile and prefabricated substations for rated voltage above 52 kV
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INTERNATIONAL ELECTROTECHNICAL COMMISSION

HIGH-VOLTAGE SWITCHGEAR AND CONTROLGEAR –**Part 205: Compact switchgear assemblies, mobile and prefabricated substations for rated voltage above 52 kV****FOREWORD**

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IEC 62271-205 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 2008. This edition constitutes a technical revision.

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

- a) References to IEC 62271-1:2021 have been updated;
- b) Scope has been supplemented;
- c) New terms "mobile substation" and "prefabricated substation" have been defined;
- d) The type test has been improved;
- e) Figure A.1 has been modified.

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

Draft	Report on voting
XX/XX/FDIS	XX/XX/RVD

176
177 Full information on the voting for its approval can be found in the report on voting indicated in
178 the above table.

179 The language used for the development of this International Standard is English.

180 This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in
181 accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available
182 at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are
183 described in greater detail at www.iec.ch/publications.

184 The committee has decided that the contents of this document will remain unchanged until the
185 stability date indicated on the IEC website under webstore.iec.ch in the data related to the
186 specific document. At this date, the document will be

- 187 • reconfirmed,
- 188 • withdrawn,
- 189 • replaced by a revised edition, or
- 190 • amended.

191 INTRODUCTION

192 Mobile/prefabricated substations usually consists of the following modules:

- 193 – High-voltage switchgear assembly module; [1]¹
- 194 – Power transformer module;
- 195 – Medium-voltage switchgear assembly module; [1]
- 196 – Protection and control module;

197 Vehicle-mounted system (only for mobile substation).

198 The CIGRE Technical Brochure 907- Mobile substations incorporating HV GIS [2] discusses the
199 range of mobile substation applications, which extend from those intended for rapid deployment
200 in an emergency through re-locatable designs to prefabricated or 'build off-site' solutions. Three
201 types of mobile substation are defined:

- 202 – Type A mobile substation: 'Short Term Emergency type unit';
- 203 – Type B mobile substation: 'Intermediate type unit';
- 204 – Type C mobile substation: 'Semi-stationary type unit'.

205 The benefits of the mobile/prefabricated substations are:

- 206 – Play an important role in disaster relief and emergency response;
- 207 – Space saving, cover a small area;
- 208 – Have a shorter construction period, compared with traditional substations;
- 209 – Easy to expand.

210

211

¹ Numbers in square brackets refer to the bibliography.

HIGH-VOLTAGE SWITCHGEAR AND CONTROLGEAR

Part 205: Compact switchgear assemblies, mobile and prefabricated substations for rated voltage above 52 kV

1 Scope

This part of IEC 62271 specifies the service conditions, rated characteristics, general structural requirements and test methods of compact switchgear assemblies, mobile substations and prefabricated substations. These compact switchgear assemblies, mobile substations and prefabricated substations are for indoor and/or outdoor installations in systems having rated voltages at the high voltage side above 52 kV and service frequencies of 50 Hz and 60 Hz.

– In general, compact switchgear assemblies consisting of at least one switching device (circuit-breakers, disconnectors/earthing switches, switches, disconnecting circuit-breakers, etc.) directly connected to one or more other devices (instrument transformers, surge arresters, bushings, cable connections, transformer connections, etc.) such that there is an interaction between the functions of the individual devices. The devices, defined by IEC standards, which may form part of a compact switchgear assembly are listed below:

- Switching devices:

– Circuit-breakers	IEC 62271-100
– Disconnectors/earthing switches	IEC 62271-102
– Switches	IEC 62271-104
– Disconnecting circuit-breakers	IEC 62271-108

- Devices:

– Instrument transformers	
– Current transformers	IEC 61869-1, IEC 61869-2
– Voltage transformers	IEC 61869-1, IEC 61869-3, IEC 61869-5
– Combined transformers	IEC 61869-4
• Surge arresters	IEC 60099-4
• Bushings	IEC 60137
• Insulators	IEC 61462, IEC 62155
• Cable connections	IEC 62271-209
• Transformer connections	IEC 62271-211

The assemblies may contain components of air insulated switchgear (AIS) only or a combination of part of AIS and part of gas insulated switchgear (GIS), so called mixed technology switchgear (MTS) and may be delivered entirely prefabricated or partially assembled.

It is not possible to define all potential arrangements of compact switchgear assemblies however four examples are shown for information in Annex A.

This standard covers the influence on performance of the interactions between devices within compact switchgear assemblies and defines ratings and test procedures for these assemblies.

This document is applicable for GIS which are covered by 62271-203:2022 if the design is applicable for mobile substation or prefabricated substation.

This document does not apply to compact switchgear assemblies consisting solely of GIS which are covered by 62271-203:2022.

– In general, it is not possible to define all potential arrangements of substations, mobile substations and prefabricated substations include at least the following modules (The typical wiring diagrams are for information in Annex B):

- High-voltage module;
- Transformer module;
- Medium-voltage module;
- Protection and control module;
- Vehicle-mounted system (only for mobile substations).

IEC 62271-1:2021 is applicable if not stated otherwise.

Note: For the use of this document high-voltage (IEC 60050-601:1985[3], 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;

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

IEC 60068-2-11:2021 Environmental testing - Part 2-11: Tests - Test Ka: Salt mist

IEC 60068-2-17:2023 Environmental testing - Part 2-17: Tests - Test Q: Sealing

IEC 60076(all parts) Power transformers

IEC 60099-4:2014 Surge arresters - Part 4: Metal-oxide surge arresters without gaps for a.c. systems

IEC 60137:2008 Insulated bushings for alternating voltages above 1000 V

IEC 60255-1:2022 Measuring relays and protection equipment - Part 1: Common requirements

IEC 61462:2007 Composite hollow insulators - Pressurized and unpressurized insulators for use in electrical equipment with AC rated voltage greater than 1 000 V AC and D.C. voltage greater than 1500V - Definitions, test methods, acceptance criteria and design recommendations

IEC 61869-1:2023 Instrument transformers - Part 1: General requirements

IEC 61869-2 Instrument transformers - Part 2: Additional requirements for current transformers

IEC 61869-3 Instrument transformers - Part 3: Additional requirements for inductive voltage transformers

IEC 61869-4 Instrument transformers - Part 4: Additional requirements for combined transformers

IEC 61869-5 Instrument transformers - Part 5: Additional requirements for capacitor voltage transformers

IEC 61936-1:2021 Power installations exceeding 1 kV AC and 1,5 kV DC - Part 1: AC

IEC 62155:2003 Hollow pressurized and unpressurized ceramic and glass insulators for use in electrical equipment with rated voltages greater than 1 000 V

IEC 62271-1:2021 High-voltage switchgear and controlgear - Part 1: Common specifications

IEC/IEEE 62271-37-082:2012 High-voltage switchgear and controlgear - Part 37-082: Standard practice for the measurement of sound pressure levels on alternating current circuit-breakers

IEC 62271-100:2021 High-voltage switchgear and controlgear - Part 100: High-voltage alternating current circuit-breakers

IEC 62271-102:2018 High-voltage switchgear and controlgear - Part 102: Alternating current disconnectors and earthing switches

IEC 62271-104:2020 High-voltage switchgear and controlgear - Part 104: Alternating current switches for rated voltages higher than 52 kV

IEC 62271-108:2020 High-voltage switchgear and controlgear - Part 108: High-voltage alternating current disconnecting circuit-breakers for rated voltages above 52 kV

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

IEC 62271-201:2014 High-voltage switchgear and controlgear - Part 201: AC solid-insulation enclosed switchgear and controlgear for rated voltages above 1 kV and up to and including 52 kV

IEC 62271-202:2022 High-voltage switchgear and controlgear - Part 202: AC prefabricated substations for rated voltages above 1 kV and up to and including 52 kV

IEC 62271-203:2022 High-voltage switchgear and controlgear - Part 203: Gas-insulated metal-enclosed switchgear for rated voltages above 52 kV

IEC 62271-209:2022 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 62271-211:2014 High-voltage switchgear and controlgear - Part 211: Direct connection between power transformers and gas-insulated metal-enclosed switchgear for rated voltages above 52 kV

IEC TR 62271-306:2018 High-voltage switchgear and controlgear - Part 306: Guide to IEC 62271-100, IEC 62271-1 and other IEC standards related to alternating current circuit-breakers

ISO 3231:1993 Paints and varnishes - Determination of resistance to humid atmospheres containing sulfur dioxide

3 Terms and definitions

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

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>

3.1 General terms

3.1.1

service position

connected position (of a removable part)

The position of a removable part in which it is fully connected for its intended function

[SOURCE: IEC 60050-441:1984, 441-16-25]

3.1.2

disconnected position (of a withdrawable part)

Position of a withdrawable part in which an isolating distance or segregation is established in all the circuits of the withdrawable part, that part remaining mechanically attached to the assembly

Note 1 to entry: The auxiliary circuits may not be disconnected in this position.

Note 2 to entry: This position may not be one in which it is safe to work on the withdrawn (moved) part.

[SOURCE: IEC 60050-441:1984, 441-16-28, modified]

3.2 Assemblies of switchgear and controlgear

3.2.1

compact switchgear assembly

A compact switchgear assembly consists of at least one switching device directly connected to, or sharing components with, one or more other devices such that there is an interaction between the functions of the individual devices. See Annex A.

Note 1 to entry: A compact switchgear assembly may be mounted on one or more structures but it is only intended for installation and operation as a single, complete unit

Note 2 to entry: Interaction is the transfer of stresses (e.g. electrical, mechanical and thermal) between the individual devices.

3.2.2

mobile substation

An electrical substation which is designed to be relocated to an alternative site and connected to grid or substation.

3.2.3

prefabricated substation

prefabricated and type-tested high-voltage assembly comprising an enclosure containing at least a power transformer and/or a high-voltage switchgear and controlgear, and usually one or several of the following components: medium-voltage switchgear and controlgear, high-voltage interconnection, medium-voltage interconnection, auxiliary and control equipment and circuits. It cannot be relocated.

Note 1 to entry: A prefabricated substation includes all main and earthing circuits to be connected through appropriate interfaces to external high-voltage and medium-voltage cables and to external earthing system and (protective) bonding conductor (if any).

[SOURCE: IEC 62271-202:2022, 3.2.101, modified, change from “low-voltage” to “medium-voltage”]

3.2.4

high-voltage module

Prefabricated modules for compact switchgear assembly, which may be enclosed or opened, may be overhead lines or cable incoming/outgoing, as well as their auxiliary and control device.

3.2.5

transformer module

Prefabricated modules for transformers and their neutral point sets, as well as auxiliary devices.

3.2.6

medium-voltage module

Medium voltage switchgear and controlgear, station transformer, reactive power compensation device, auxiliary and control device, etc., are fixed in the prefabricated module in the equipment cabin or in outdoor.

Note 1 to entry: Auxiliary and control device mainly includes temperature control, lighting, fire alarm and environmental monitoring device.

3.2.7

protection and control module

A module which is integrated with automation system, scheduling automation system, communication system, relay protection and safety automatic device, AC and DC power supply system, time synchronization device, auxiliary facilities intelligent control and other equipment.

3.2.8

vehicle-mounted system

The trailer can carry at least one module of vehicle-mounted mobile substation.

4 Normal and special service conditions

Clause 4 of IEC 62271-1:2021 [1] and subclause 4.4 of IEC 61936-1:2021 [4] are applicable.

5 Rating

5.1 General

Subclause 5.1 of IEC 62271-1:2021 is partly applicable with the following distinctive features:

The rating of a compact switchgear assembly and its controlgear comprise the following:

- a) rated voltage (U_r);
 - b) rated insulation level (U_p , U_d and U_s , where applicable);
 - c) rated frequency (f_r);
 - d) rated continuous current (I_r) (for main circuits);
 - e) rated short-time withstand current (I_k) (for main and earthing circuits);
 - f) rated peak withstand current (I_p) (for main and earthing circuits);
 - g) rated duration of short-circuit (t_k);
- and as applicable
- h) rated supply voltage of auxiliary and control circuits (U_a);
 - i) rated supply frequency of auxiliary circuits.

The ratings of the compact switchgear assembly shall be assigned to ensure that operation of the assembly within its assigned ratings does not expose any individual device to conditions which are outside its rated capabilities.

Note: Relevant ratings for power transformers are covered by IEC 60076 (all parts).

Further ratings to be agreed with user and manufacturer.

5.2 Rated voltage (U_r)

Subclause 5.2 of IEC 62271-1:2021 is applicable with the following addition:

The compact switchgear assembly shall be demonstrated to be suitable for the rated voltage.

Note 1: Devices forming part of the compact switchgear assembly may have individual values of rated voltage in accordance with the relevant standards.

Note 2: For the purposes of this standard, the rated voltage (U_r) defined in IEC 62271-1:2021 is the rated voltage of the compact switchgear assembly (U_r).

5.3 Rated insulation level

Subclause 5.3 of IEC 62271-1:2021 and the standards relevant to the components are applicable with the following addition:

The compact switchgear assembly shall be demonstrated to be suitable for the rated insulation level.

5.4 Rated frequency (f_r)

Subclause 5.4 of IEC 62271-1:2021 is applicable with the following addition:

The compact switchgear assembly shall be demonstrated to be suitable for the rated frequency.

5.5 Rated continuous current (I_r)

Subclause 5.5 of IEC 62271-1:2021 is applicable with the following addition:

The compact switchgear assembly and its connections in the main current path shall be demonstrated to be suitable for the rated continuous current.