Technical Specification 41-36
Issue 3 2012

SWITCHGEAR FOR SERVICE UP TO 36kV
(CABLE AND OVERHEAD CONDUCTOR CONNECTED)
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SWITCHGEAR FOR SERVICE UP TO 36kV  
(CABLE AND OVERHEAD CONDUCTOR CONNECTED)

FOREWORD

This technical specification has been prepared by the Energy Networks Association.

The Electricity at Work Regulations 1989 made under the Health and Safety at Work etc. Act 1974, apply to switchgear whenever manufactured, purchased or installed. Appendix 2 of the Memorandum of guidance on the Regulations lists Standards, Codes of Practice and other publications which contain guidance relevant to the Regulations and electrical safety.

This technical specification lists International and British Standards, including the aforementioned, relevant to switchgear.

Switchgear covered by this technical specification shall comply with the International and British Standards listed. This document is intended to amplify and/or clarify the requirements of those Standards, where alternative arrangements are permitted by those Standards and further information is required.

This technical specification should be read in conjunction with the relevant International and British Standards, and to assist in cross-reference, the document follows the format of the major International Standards. Where possible, the international standards' clause numbers have been used, preceded with the number of the relevant part of this technical specification.

Part 1 of the document covers all common clause requirements of switchgear, as defined. Clauses specific to particular equipments are covered in the subsequent Parts of the document.

Annex D of the document includes ‘Self Certification Conformance Declaration’ sheets and ‘Type Test Conformance Declaration’ tables to enable manufacturers to declare conformance or otherwise, clause by clause, with the relevant parts of the document.

SCOPE

This technical specification defines technical requirements for switchgear rated at voltages within the range 7.2kV to 36kV, for use on 6.6kV, 11kV, 20kV and 33kV systems and supersedes Energy Networks Association technical specification, ENA TS 41-36 Issue 2.

It applies to alternating current switchgear, designed for indoor or outdoor installation, cable or overhead conductor connected, and for operation at service frequency of 50Hz on systems having voltages above 1000V as detailed above.

It covers the requirements of ground or transformer-mounted, pole or structure mounted, metal-enclosed switchgear and pole or structure mounted non-enclosed switchgear, as defined.

Equipment covered by this technical specification is for use on systems with the neutral point earthed solidly, or through a resistor or reactor.
NORMATIVE REFERENCES

This technical specification makes reference to the following documents and it is important that users of all standards and technical specifications ensure that they are applying the most recent editions together with any amendments.

The Construction Design and Management Regulations 2007  
The Electricity Safety, Quality and Continuity Regulations 2002  
The Electricity at Work Regulations 1989  
The Health and Safety at Work etc. Act 1974,

IEC 60044-1 - Instrument transformers – Part 1: Current transformers  
IEC 60044-2 - Instrument transformers – Part 2: Voltage transformers  
IEC 60050-441 - International electro technical vocabulary switchgear, controlgear and fuses  
IEC 60073 - Basic and safety principles for man-machine interface, marking and identification - Coding principles for indication devices and actuators  
IEC 60376 - Specification of technical grade sulphur hexafluoride (SF₆) for use in electrical equipment  
IEC 60417 - Graphical symbols for use on equipment  
IEC 60445 - Basic and safety principles for man-machine interface, marking and identification - Identification of equipment terminals and of terminations certain designated conductors, including general rules for an alphanumeric system  
IEC 60480 - Guidelines for checking and treatment of sulphur hexafluoride (SF₆) taken from electrical equipment and specification for its re-use  
IEC 60446 - Basic and safety principles for man-machine interface, marking and identification - Identification of conductors by colours or numerals  
IEC 60466 - Insulation-Enclosed Switchgear and Controlgear for Rated Voltages Above 1 kV and up to and Including 38 kV  
IEC 60529 - Degrees of protection provided by enclosures (IP code)  
IEC 60617 - Graphical symbols for diagrams  
IEC 60815 - Guide for the selection of insulators in respect of polluted conditions  
IEC 61109 - Insulators for overhead lines - Composite suspension and tension insulators for a.c. systems with a nominal voltage greater than 1000 V - Definitions, test methods and acceptance criteria  
IEC 61243 - Live working - Voltage detectors  
IEC 61958 - Voltage presence indicating systems  
IEC 62262 - Degrees of protection provided by enclosures for electrical equipment of switchgear and controlgear  
IEC 62271-1 - High-voltage switchgear and controlgear – Part 1: Common specifications  
IEC 62271-100 - High-voltage alternating current circuit-breakers  
IEC 62271-103 - High-voltage switchgear and controlgear –
Part 103: Switches for rated voltages above 1kV and up to and including 52kV

IEC 62271-102 - High-voltage alternating current disconnectors and earthing switches
IEC 62271-105 - High-voltage alternating current switch-fuse combinations
IEC 62271-200 - A.C. metal-enclosed switchgear and controlgear for rated voltages above 1kV and up to and including 52kV
IEC 62271-202 - High voltage / low voltage prefabricated substations
IEC 62271-303 - High-voltage switchgear and controlgear – Part 303: Use and handling of sulphur hexafluoride ($SF_6$)

ISO 9001 - Management and quality assurance standards
ISO 12732-1 - Ergonomics of thermal environment – Methods for assessment of human responses to contact with surfaces Part 1 Hot surfaces

BS EN 60168 - Post insulators of ceramic material or glass for nominal voltages greater than 1000V (Associated Standards, IEC 60273)
BS 148 - Specification for unused and reclaimed mineral insulating oil for transformers and switchgear (Associated Standards IEC 296)
BS 381C - Specification for colours for identification, coding and special purposes
BS 2562 - Specification for cable boxes for transformers and reactors
BS 2692 - Fuses for voltages exceeding 1000V ac (Associated Standard IEC 60282)
BS 2874 - Specification for copper and copper alloy rods and sections (other than forging stock)
BS 4608 - Specification for copper for electrical purposes (rolled strip, sheet and foil)
BS 4781 - Specification for pressure sensitive adhesive plastic labels for permanent use
BS 5207 - Specification for sulphur hexafluoride for electrical equipment (Associated standard IEC 60376)
BS 5499 - Safety Signs and Colours
BS 6121 - Mechanical cable glands - Specification for metallic glands
BS 6553 - Guide for selection of fuse-links of high-voltage fuses for transformer circuit applications (Associated Standard IEC 60787)
BS 6626 - Code of practice for maintenance of electrical switchgear and controlgear for voltages above 1000V and up to and including 36kV
BS 7198 - Hydraulic fluid power quick-action couplings (Associated Standard ISO 7241)
BS 7354 - Design of high-voltage open-terminal substations
BS IEC 60076-7 - Loading guide for oil-immersed transformers
ANSI/IEEE C37.60 - American National Standard requirements for overhead, pad-mounted, dry-vault and submersible automatic circuit reclosers and fault interrupters for a.c. systems
ENA TS 12-6 - Time Fuse-Links
ENA TS 12-8 - The application of fuse-links to 11kV/415V and 6.6kV/415V underground distribution networks
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<td>Guide to the assessment of power system plant &amp; products* for use by the Energy Networks Association member companies</td>
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1 COMMON CLAUSES

1.1 General

International Standard IEC 62271-1 “High-voltage Switchgear and Controlgear Part 1: Common Specifications”, shall apply except where modified by the following common clauses.

The requirements for metal enclosed switchgear and controlgear are specified in International Standard IEC 62271-200 “A.C. Metal-enclosed Switchgear and Controlgear for Rated Voltages Above 1kV and up to and Including 52kV”. Where necessary, reference is made to the relevant clauses of IEC 62271-200 in this Part 1.

This Part 1 of this technical specification amplifies and/or clarifies the requirements of IEC 62271-1 and IEC 62271-200 where alternative arrangements are permitted by IEC 62271-1 and IEC 62271-200 and further information is necessary to meet UK Distribution Network Operator’s (DNOs) requirements.

Parts 2 to 10 of this technical specification in cover additional requirements specific to individual equipment, which are not included in Part 1.

NOTES: The numbering of sub-clauses generally follows that of the ruling standard for the equipment. Where this document introduces requirements not covered by the standard, the numbering starts at X.201, where X is replaced by the Part number for the specific equipment

The sub-clause numbering in later parts follows the numbering sequence in Part 1, except ‘1’ is replaced by the Part number for the specific equipment (e.g. ‘2’ for circuit breakers)

The requirements of this Part 1 of this technical specification shall also apply to withdrawable retrofit circuit breakers where indicated by an ‘R’ in the associated Self Certification Conformance Declarations (‘Retrofit’ column).

1.1.101 Quality management

Quality assurance schemes shall be in place and in accordance with ISO 9001 and shall cover all aspects of design and manufacture of the complete equipment up to the final delivery stage and shall apply to all locations at which these activities take place.

1.2 Normal and special service conditions

Clause 2 of IEC 62271-1 and, for metal-enclosed switchgear, Clause 2 of IEC 62271-200 are applicable with the following limitations.

1.2.1 Normal service conditions

1.2.1.1 Indoor switchgear and controlgear

The ambient air temperature does not exceed 40°C and its average value, measured over a period of 24 hrs, does not exceed 35°C.

The minimum ambient air temperature is -5°C (class minus 5 indoor).

Manufacturers shall clearly state in the conformance declarations, any environmental conditions specified in 2.1.1 of IEC 62271-1 that the switchgear cannot tolerate without environmental control, and as such what environmental controls/conditions are required.
1.2.1.2 Outdoor switchgear and controlgear

The ambient air temperature does not exceed 40°C and its average value, measured over a period of 24 h, does not exceed 35°C.

The minimum ambient air temperature is -25°C (class minus 25 outdoor).

The ice coating does not exceed 10mm for class 10.

The pollution level of insulation shall be Class III (heavy) of IEC 60815.

Account shall be taken of the influence of solar radiation up to a level of 1000 W/m² (on a clear day at noon) and supporting evidence provided.

1.3 Terms and definitions

Clause 3 of IEC 62271-1 and, for metal-enclosed switchgear, Clause 3 of IEC 62271-200 are applicable with the following additions:

1.3.201 Dependent manual operation (of a mechanical switching device)
IEV 441-16-13

An operation solely by means of directly applied manual energy, such that the speed and force of the operation are dependent upon the action of the operator.

1.3.202 Independent manual operation (of a mechanical switching device)
IEV 441-16-16

A stored energy operation where the energy originates from manual power, stored and released in one continuous operation, such that the speed and force of the operation are independent of the action of the operator.

1.3.203 Independent power operation (of a mechanical switching device)

A stored energy operation where the energy originates from power other than manual, stored and released in one continuous operation, such that the speed and force of the operation are independent of the action of the power source.

NOTE: This kind of operation may be by an actuator fitted to an independent manual mechanism.

1.3.204 Anti-pumping device

A device which prevents reclosing after a close-open operation as long as the device initiating closing is maintained in the position for closing.

1.3.205 Operations

1.3.205.1 Normal operation

When equipment is operated as intended using the manual handle (as supplied by the manufacturer), control switches, and interlock keys.

NOTE: Normal operations includes switching, cable testing, LV isolation, but excludes maintenance.