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Indian Standard

CODE OF PRACTICE FOR SELECTION, INSTALLATION AND MAINTENANCE OF SWITCHGEAR AND CONTROLGEAR

PART 1 GENERAL

(First Revision)

1 SCOPE

1.1 This standard (Part 1) covers the general aspects pertaining to the selection, installation and maintenance of all types of switchgear and controlgear for indoor and outdoor use.

1.2 For the purpose of this standard special types of equipment such as those intended for use in hazardous atmospheres are excluded, Provisions for the same provided in separate Indian Standards.

1.3 Specific provisions relating to the practices for individual equipment, and equipment for individual applications in respects of selection and installation and maintenance from the scope of subsequent pars of this standard.

2 REFRENCES

The standards listed in Annex A contain provisions which, through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated in Annex A.

3 TERMINOLOGY

For the purpose of this standard, the definitions given in IS 1885 (Part XVII) : 1979 shall apply.

4 GENERAL PROVISIONS

4.1 Exchange of Information

4.1.1 Before ordering the plant, information should be exchanged between the owner, architect, engineer and equipment manufacturer responsible for its design, procurement, installation, operation and maintenance, so that the plant is procured to suit the duty, location and installation conditions under which the switchgear will operate. This information should include any special building features, such as access doors, lifting beams, oil pumps, cable trenches, foundation details, ventilating arrangement, weather conditions, etc., which may be desirable (*see also* Part 2 and Part 3 of this standard) as also the incorporation of any optional features in the switchgear.

4.1.2 Details of the electric supply available and of any special requirement regarding the rating of equipment which may be connected to the supply should be ascertained from the supply authority.

4.2 Transport Facilities

The engineer should obtain well in advance all relevant information about the overall dimensions, weight for transport, installation, etc. of the switchgear in question. Special precautions may be essential for the protection of insulation during shipment and prior to energizing to prevent moisture absorption due to rain, snow or condensation. These may include shipment of insulting parts in oil to prevent contamination. Appropriate instruction should be given in this regard. When the circuit-breaker is dismantled for transport, all parts should be clearly marked, drawings showing assembly of these parts and a packing list should be supplied to the user.

4.3 Drawings, Materials and Appliances

4.3.1 The manufacture should provide drawings and instructions for the installation and maintenance of switchgear well in advance of the time of delivery. It is essential that the accordance with the provisions of the relevant Indian Standard or the instructions given by the manufacturer.

4.3.2 All materials, fitting, apparatus, etc., used in the installation shall conform to relevant Indian Standard specification wherever they exist, and in the case where they do not exist, the items shall be approved by competent authority.

5 SAFETY AND STATUTORY REGULATIONS

5.1 Compliance with Indian Electricity Rules and Other Regulations

5.1.1 All electrical installations shall comply with the requirements of the *Indian Electricity Act* and Rules made thereunder and with other regulations.

Such as those made under *Factory Act*, 1948 and *Fire Insurance Act*, that may be applicable. The following rules of *Indian Electricity Rules* 1956 are particularly applicable:

No. 29, 33, 34, 35, 36, 50, 51, 61, 62, 63, 64, 65, 67, 69 and 114.

5.1.2 If considered necessary the local authorities concerned in the administration of the rules and regulations in the matter of the layout of the installation of the switchgear should be consulted in regard to the rules and regulations that may be applicable.

5.1.3 The electrical installation shall be carried out only by authorized persons competent to undertake such work under the rules and regulations that may be in force in different states.

5.2 Earthing

5.2.1 It is absolutely essential that the entire earthing system should be designed with regard to the maximum available earth-fault current. This should be particularly checked whenever any plan extensions resulting in higher fault levels are made to ensure that the existing connections are suitable for the increased earth-fault current.

5.2.2 For additional details regarding earthing and size of earth bus and conductor, reference shall be made to IS 3043.

5.3 Isolation

It is desirable to provide means for isolation of individual circuit or equipment of switchgear so that maintenance work can be under taken on such circuits or equipment in complete safety, without the necessity of shutting down the whole switchboard.

5.4 Lightning Protection

Where considered appropriate, the necessary precautions shall be taken to ensure that the installation of switchgear and controlgear shall be protected from lightning surges. General guidelines are available in IS/IEC 62305 (Part 1 to Part 4).

5.5 Oil Drainage

For indoor switchgear, an oil soak pit shall be provided where a single chamber of indoor switchgear has an oil capacity of more than 2 000 l. For outdoor switchgear, suitable arrangement for drainage of oil shall be made.

6 CATEGORIZATION OF EQUIPMENT

6.1 It is an accepted practice to broadly classify switchgear and controlgear equipment based on rated voltage. Low-voltage switchgear and controlgear are those intended for rated voltage up to and including 1 000 V a.c. or 1 200 V d.c. and high voltage switchgear and controlgear are those intended for voltages above 1 000 V a.c.

6.2 Individual equipment are further classified depending on the method of operation or on the type of construction. Product classifications are covered in Part 2 of this standard.

ANNEX A

(Foreword)

LIST OF INDIAN STANDARDS

A-1 LOW-VOLTAGE SWICHGEAR AND CONTROLGEAR

Indian Standard	*Title*
IS 1885 (Part XVII) : 1979	Electrotechnical vocabulary: Part XVII Switchgear and controlgear (*first revision*)
IS 2086 : 1993	Carriersand bases inrewirabletype electric fuses for voltages up to 650 V — Specification (*third revision*)
IS 2675 : 1983	Specification for enclosed distribution fuse boards and cutouts for voltages not exceeding 1 000 V a.c. and 1 200 V d.c. (*second revision*)
IS 5039 : 1983	Specification for distribution pillars for voltages not exceeding 1 000 V a.c. and 1 200 V d.c. (*first revision*)
IS 5578 : 1984	Guide for marking of insulated conductors (*first revision*)
IS 7118 : 1973	Recommendations for direction of movement for control devices operating electrical apparatus
IS 8187 : 1976	Specification for D-type fuses
IS 8200 : 1976	Specification for toggle switches for traction application
IS 8588 (Part 1) : 1977	Specification for thermostatic bimetals: Part 1 General requirements and methods of tests
IS 8623 (Part 1) : 1993/ IEC 60439-1 : 1985	Specification for low voltage switchgear and controlgear assemblies: Part 1 Requirements for type-tested and partially type-tested assemblies (*first revision*)
8623 (Part 2) : 1993/ IEC 60439- 2 : 1985	Specification for low voltage switchgear and controlgear assemblies: Part 2 Particular requirements for busbar trunking systems (busway) (*first revision*)
IS 11353 : 1985	Guide for uniform system of marking and identification of conductors and apparatus terminals
IS 12032 (Part 7) : 1987/ IEC 60617-7 : 1983	Graphical symbols for diagrams in the field of electrotechnology: Part 7 Switchgear, controlgear and protective devices
IS 12640 (Part 1) : 2016/ IEC 61008-1 : 2012	Residual current operated circuit-breakers without integral overcurrent protection for household and similar uses RCCBs: Part 1 General rules (*second revision*)
IS 12640 (Part 2) : 2016/ IEC 61009-1 : 2012	Residual current operated circuit-breakers with integral overcurrent protection for household and similar uses RCBOs: Part 2 General rules (*second revision*)
IS 13703 (Part 1) : 1993/ IEC 60269-1 : 1986	Specification for low voltage fuses for voltages not exceeding 1 000 V a.c. or 1 500 V d.c.: Part 1 General requirements
IS 13703 (Part 2/Sec1) : 1993/ IEC 60269-2 : 1986	Specification for low voltage fuses for voltages not exceeding 1 000 V a.c. or 1 500 V d.c.: Part 2 Fuses for use by authorized persons, Section 1 Supplementary requirements
IS 13703 (Part 4) : 1993/ IEC 60269-4 : 1980	Specification for low voltage fuses for voltages not exceeding 1 000 V a.c. or 1 500 V d.c.: Part 4 Supplementary requirements for fuse links for the protection of semiconductor devices
IS 16504 (Part 1) : 2017/ IEC 60204-1 : 2008	Safety of machinery — Electrical equipment of machines: Part 1 General requirements
IS/IEC 60947 (Part 1) : 2007	Low-voltage switchgear and controlgear: Part 1 General rules (*first revision*)
IS/IEC 60947 (Part 2) : 2003	Low-voltage switchgear and controlgear: Part 2 Circuit breakers

Indian Standard	*Title*
IS/IEC 60947 (Part 3) : 2012	Low voltage switchgear and controlgear: Part 3 Switches disconnectors, switch disconnectors and fuse combination units (*first revision*)
IS/IEC 60947 (Part 4/Sec 1) : 2012	Low-voltage switchgear and controlgear: Part 4 Contactors and motor-starters, Section 1 Electromechanical contactors and motor-starters (*first revision*)
IS/IEC 60947 (Part 4/Sec 2) : 2011	Low-voltage switchgear and controlgear: Part 4 Contactors and motor-starters, Section 2 a.c. Semiconductor motor controllers and starters (*first revision*)
IS/IEC 60947 (Part 4/ Sec 3) : 2011	Low-voltage switchgear and controlgear: Part 4 Contactors and motor-starters, Section 3 a. c. Semiconductor motor controllers and contactors for non-motor loads (*first revision*)
IS/IEC 60947 (Part 5/Sec 1) : 2009	Low-voltage switchgear and controlgear: Part 5 Control circuit devices and switching elements, Section 1 Electromechanical control circuit devices (*first revision*)
IS/IEC 60947 (Part 5/Sec 2) : 2007	Low-voltage switchgear and controlgear: Part 5 Control circuit devices and switching elements, Section 2 Proximity switches
IS/IEC 60898 (Part 1) : 2002	Electrical accessories — Circuit-breakers for overcurrent protection for household and similar installations: Part 1 Circuit-breakers for a.c. operation
IS/IEC 60898 (Part 2) : 2002	Electrical accessories — Circuit-breakers for overcurrent protection for household and similar installations: Part 2 Circuit-breakers for a.c. and d.c. operation
IS/IEC 61439 (Part 0) : 2014	Low-voltage switchgear and controlgear assemblies: Part 0 Guidance to specifying assemblies
IS/IEC 61439 (Part 2) : 2011	Low voltage switch gear and controlgear assemblies: Part 2 Power switch gear and control gear assemblies

A-2 HIGH VOLTAGE SWICHGEAR AND CONTROLGEAR

Indian Standard	*Title*
IS 5561 : 2018	Specification for electric power connectors (*first revision*)
IS 5578 : 1984	Guide for marking of insulated conductors (*first revision*)
IS 8084 : 1976	Specification for interconnecting busbars for a.c. voltage above 1 kV up to and including 36 kV
IS 9135 : 1979	Guide for the testing of circuit-breakers with respect to out-of-phase switching
IS 9385 (Part I) : 1979	Specification for high voltage fuses: Part I Current limiting fuses
IS 9385 (Part II) : 1980	Specification for high voltage fuses: Part II Expulsion and similar fuses
IS 9385 (Part III) :1980	Specification for high voltage fuses: Part III Application guide for high voltage fuses
IS 9402 : 1980	Specification for high-voltage fuses foe the external protection of shunt power capacitor
IS 11353 : 1985	Guide for uniform system of marking and identification of conductors and apparatus terminals
IS 12032 (Part 7) : 1987	Graphical symbols for diagrams in the field of electrotechnology: Part 7 Switchgear, controlgear and protective devices
IS/IEC 60470 : 2000	High voltage alternating current contactors and contactor-based motor-starters
IS/IEC 62271 (Part 1) : 2007	High-voltage switchgear and controlgear: Part 1 Common Specifications
IS/IEC 62271 (Part 100) : 2008	High-voltage switchgear and controlgear: Part 100 Alternating current circuit-breakers

Indian Standard	*Title*
IS/IEC 62271 (Part 102) : 2008	High-voltage switchgear and controlgear: Part 102 Alternating current disconnectors and earthing switches
IS/IEC 62271 (Part 103) : 2011	High-voltage switchgear and controlgear: Part 103 Switches for rated voltages above 1 kV up to and including 52 kV
IS/IEC 62271 (Part 104) : 2009	High-voltage switchgear and controlgear: Part 104 Switches for rated voltages above 52 kV
IS/IEC 62271 (Part 105) : 2002	High-voltage switchgear and controlgear: Part 105 Alternating current switch-fuse combinations
IS/IEC 62271 (Part 109) : 2008	High-voltage switchgear and controlgear: Part 109 Alternating current series capacitor by-pass switches
IS/IEC 62271 (Part 111) : 2012	High-voltage switchgear and controlgear: Part 111 Automatic circuit reclosures and fault interrupters for alternating current systems up to 38 kV
IS/IEC 62271 (Part 200) : 2003	High-voltage switchgear and controlgear: Part 200 a.c. metal-enclosed switchgear and controlgear for rated voltages above 1 kV and up to and including 52 kV
IS/IEC 62271 (Part 201) : 2006	High-voltage switchgear and controlgear: Part 201 AC insulation-enclosed switchgear and controlgear for rated voltages above 1 kV and up to and including 52 kV
IS/IEC 62271 (Part 202) : 2014	High-voltage switchgear and controlgear: Part 202 High-voltage/ low-voltage prefabricated substation
IS/IEC 62271 (Part 203) : 2011	High-voltage switchgear and controlgear: Part 203 Gas-insulated metal-enclosed switchgear for rated voltages above 52 kV (*first revision*)
IS/IEC 62271 (Part 207) : 2007	High-voltage switchgear and controlgear: Part 207 Seismic qualification for gas insulated switchgear assemblies for rated voltages above 52 kV
IS/IEC 62271 (Part 301) : 2018	High-voltage switchgear and controlgear: Part 301 Dimensional standardization of high voltage terminals

Bureau of Indian Standards

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