INTERNATIONAL STANDARD

IEC 60694

Edition 2.2
2002-01

Edition 2:1996 consolidated with amendments 1:2000 and 2:2001

Common specifications for high-voltage switchgear and controlgear standards

*This **English-language** version is derived from the original **bilingual** publication by leaving out all French-language pages. Missing page numbers correspond to the French-language pages.*

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

COMMON SPECIFICATIONS FOR HIGH-VOLTAGE SWITCHGEAR AND CONTROLGEAR STANDARDS

FOREWORD

1) The IEC (International Electrotechnical Commission) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of the IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, the IEC publishes International Standards. Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. The IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
2) The formal decisions or agreements of the IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested National Committees.
3) The documents produced have the form of recommendations for international use and are published in the form of standards, technical specifications, technical reports or guides and they are accepted by the National Committees in that sense.
4) In order to promote international unification, IEC National Committees undertake to apply IEC International Standards transparently to the maximum extent possible in their national and regional standards. Any divergence between the IEC Standard and the corresponding national or regional standard shall be clearly indicated in the latter.
5) The IEC provides no marking procedure to indicate its approval and cannot be rendered responsible for any equipment declared to be in conformity with one of its standards.
6) Attention is drawn to the possibility that some of the elements of this International Standard may be the subject of patent rights. The IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 60694 has been prepared by subcommittee 17A: High-voltage switchgear and controlgear, and subcommittee 17C: High-voltage enclosed switchgear and controlgear, of IEC technical committee 17: Switchgear and controlgear.

This consolidated version of IEC 60694 consists of the second edition (1996) [documents 17A/458/FDIS and 17A/479/RVD, its amendment 1 (2000) [documents 17A/579/FDIS and 17A/588/RVD], its corrigendum of January 2001, its amendment 2 (2001) [documents 17A/599/FDIS and 17A/609/RVD] and its corrigendum of December 2001.

The technical content is therefore identical to the base edition and its amendments and has been prepared for user convenience.

It bears the edition number 2.2.

A vertical line in the margin shows where the base publication has been modified by amendment 1, amendment 2 and the corrigenda.

Annexes A, B and C form an integral part of this standard.

Annexes D to H are for information only.

The following differences exist in some countries:

6.2.11 The required test voltage for disconnectors and switch-disconnectors of all rated voltages is 100 % of the tabulated voltage in columns 3 of tables 1a or 1b and 2a or 2b (Canada, France, Italy).

The committee has decided that the contents of the base publication and its amendments will remain unchanged until 2007. At this date, the publication will be

- reconfirmed;
- withdrawn;
- replaced by a revised edition, or
- amended.

COMMON SPECIFICATIONS FOR HIGH-VOLTAGE SWITCHGEAR AND CONTROLGEAR STANDARDS

1 General

1.1 Scope

This International Standard applies to a.c. switchgear and controlgear, designed for indoor and outdoor installation and for operation at service frequencies up to and including 60 Hz on systems having voltages above 1 000 V.

This standard 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.

1.2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All normative documents are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

IEC 60034-1:1996, *Rotating electrical machines – Part 1: Rating and performance*

IEC 60038:1983, *IEC standard voltages*

IEC 60050(131):1978, *International Electrotechnical Vocabulary (IEV) – Chapter 131: Electric and magnetic circuits*

IEC 60050(151):1978, *International Electrotechnical Vocabulary (IEV) – Chapter 151: Electrical and magnetic devices*

IEC 60050(191):1990, *International Electrotechnical Vocabulary (IEV) – Chapter 191: Dependability and quality of service*

IEC 60050(301):1983, *International Electrotechnical Vocabulary (IEV) – Chapter 301: General terms on measurements in electricity*

IEC 60050-351:1998, *International Electrotechnical Vocabulary (IEV) – Part 351: Automatic control*

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

IEC 60050(446):1983, *International Electrotechnical Vocabulary (IEV) – Chapter 446: Electrical relays*

IEC 60050(581):1978, *International Electrotechnical Vocabulary (IEV) – Chapter 581: Electromechanical components for electronic equipment*

IEC 60050(604):1987, *International Electrotechnical Vocabulary (IEV) – Chapter 604: Generation, transmission and distribution of electricity – Operation*

IEC 60050(811):1991, *International Electrotechnical Vocabulary (IEV) – Chapter 811: Electric traction*

IEC 60050(826):1982, *International Electrotechnical Vocabulary (IEV) – Chapter 826: Electrical installations of buildings*

IEC 60051-2:1984, *Direct acting indicating analogue electrical measuring instruments and their accessories – Part 2: Special requirements for ammeters and voltmeters*

IEC 60051-4:1984, *Direct acting indicating analogue electrical measuring instruments and their accessories – Part 4: Special requirements for frequency meters*

IEC 60051-5:1985, *Direct acting indicating analogue electrical measuring instruments and their accessories – Part 5: Special requirements for phase meters, power factor meters and synchroscopes*

IEC 60056:1987, *High-voltage alternating-current circuit-breakers*

IEC 60059:1938, *IEC standard current ratings*

IEC 60060-1:1989, *High-voltage test techniques – Part 1: General definitions and test requirements*

IEC 60064:1993, *Tungsten filament lamps for domestic and similar general lighting purposes – Performance requirements*

IEC 60068-2 (all parts), *Environmental testing – Part 2: Tests*

IEC 60068-2-1:1990, *Environmental testing – Part 2: Tests. Tests A: Cold*

IEC 60068-2-2:1974, *Environmental testing – Part 2: Tests. Tests B: Dry heat*

IEC 60068-2-3:1969, *Environmental testing – Part 2: Tests. Test Ca: Damp heat, steady state*

IEC 60068-2-17:1994, *Environmental testing – Part 2: Tests – Test Q: Sealing*

IEC 60068-2-30:1980, *Environmental testing – Part 2: Tests. Test Db and guidance: Damp heat, cyclic (12 + 12-hour cycle)*

IEC 60068-2-63:1991, *Environmental testing – Part 2: Tests – Test Eg: Impact, spring hammer*

IEC 60071-1:1993, *Insulation co-ordination – Part 1: Definitions, principles and rules*

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

IEC 60073:1996, *Basic and safety principles for man-machine interface, marking and identification – Coding principles for indication devices and actuators*

IEC 60081:1997, *Double-capped fluorescent lamps – Performance specifications*

IEC 60083:1997, *Plugs and socket-outlets for domestic and similar general use standardized in member countries of IEC*

IEC 60085:1984, *Thermal evaluation and classification of electrical insulation*

IEC 60115-4:1982, *Fixed resistors for use in electronic equipment – Part 4: Sectional specification: Fixed power resistors*

IEC 60130 (all parts), *Connectors for frequencies below 3 MHz*

IEC 60227 (all parts), *Polyvinyl chloride insulated cables of rated voltages up to and including 450/750 V*

IEC 60228:1978, *Conductors of insulated cables*

IEC 60245 (all parts), *Rubber insulated cables – Rated voltages up to and including 450/750 V*

IEC 60255-5:1977, *Electrical relays – Part 5: Insulation tests for electrical relays*

IEC 60255-8:1990, *Electrical relays – Part 8: Thermal electrical relays*

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 60255-21-3:1993, *Electrical relays – Part 21: Vibration, shock, bump and seismic tests on measuring relays and protection equipment – Section 3: Seismic tests*

IEC 60255-23:1994, *Electrical relays – Part 23: Contact performance*

IEC 60269-1:1998, *Low-voltage fuses – Part 1: General requirements*

IEC 60269-2:1986, *Low-voltage fuses – Part 2: Supplementary requirements for fuses for use by authorized persons (fuses mainly for industrial application)*

IEC 60269-2-1:1998, *Low-voltage fuses – Part 2-1: Supplementary requirements for fuses for use by authorized persons (fuses mainly for industrial application) – Sections I to V: Examples of types of standardized fuses*

IEC 60270:1981, *Partial discharge measurements*

IEC 60296:1982, *Specification for unused mineral insulating oils for transformers and switchgear*

IEC 60309-1:1999, *Plugs, socket-outlets and couplers for industrial purposes – Part 1: General requirements*

IEC 60309-2:1999, *Plugs, socket-outlets and couplers for industrial purposes – Part 2: Dimensional interchangeability requirements for pin and contact-tube accessories*

IEC 60326 (all parts), *Printed boards*

IEC 60376:1971, *Specification and acceptance of new sulphur hexafluoride*

IEC 60393-1:1989, *Potentiometers for use in electronic equipment – Part 1: Generic specification*

IEC 60417 (all parts), *Graphical symbols for use on equipment*

IEC 60445:1999, *Basic and safety principles for man-machine interface, marking and identification – Identification of equipment terminals and of terminations of certain designated conductors, including general rules for an alphanumeric system*

IEC 60480:1974, *Guide to the checking of sulphur hexafluoride (SF_6) taken from electrical equipment*

IEC 60485:1974, *Digital electronic d.c. voltmeters and d.c. electronic analogue-to-digital converters*

IEC 60502-1:1997, *Power cables with extruded insulation and their accessories for rated voltages from 1 kV (U_m = 1,2 kV) up to 30 kV (U_m = 36 kV) – Part 1: Cables for rated voltages of 1 kV (U_m = 1,2 kV) and 3 kV (U_m = 3,6 kV)*

IEC 60507:1991, *Artificial pollution tests on high-voltage insulators to be used on a.c. systems*

IEC 60512-2:1985, *Electromechanical components for electronic equipment; basic testing procedures and measuring methods – Part 2: General examination, electrical continuity and contact resistance tests, insulation tests and voltage stress tests*

IEC 60529:1989, *Degrees of protection provided by enclosures (IP code)*

IEC 60617, *Graphical symbols for diagrams*

IEC 60669-1:1998, *Switches for household and similar fixed-electrical installations – Part 1: General requirements*

IEC 60721, *Classification of environmental conditions*

IEC 60730-2-9:1992, *Automatic electrical controls for household and similar use – Part 2: Particular requirements for temperature sensing controls*

IEC 60730-2-13:1995, *Automatic electrical controls for household and similar use – Part 2: Particular requirements for humidity sensing controls*

IEC 60815:1986, *Guide for the selection of insulators in respect of polluted conditions*

IEC 60816:1984, *Guide on methods of measurement of short-duration transients on low-voltage power and signal lines*

IEC 60947-2:1995, *Low-voltage switchgear and controlgear – Part 2: Circuit-breakers*

IEC 60947-3:1999, *Low-voltage switchgear and controlgear – Part 3: Switches, disconnectors, switch-disconnectors and fuse-combination units*

IEC 60947-4-1:1990, *Low-voltage switchgear and controlgear – Part 4: Contactors and motor-starters – Section One: Electromechanical contactors and motor-starters*

IEC 60947-4-2:1995, *Low-voltage switchgear and controlgear – Part 4: Contactors and motor-starters – Section 2: AC semiconductor motor controllers and starters*

IEC 60947-5-1:1997, *Low-voltage switchgear and controlgear – Part 5: Control circuit devices and switching elements – Section One: Electromechanical control circuit devices*

IEC 60947-7-1:1989, *Low-voltage switchgear and controlgear – Part 7: Ancillary equipment – Section One: Terminal blocks for copper conductors*

IEC 60947-7-2:1995, *Low-voltage switchgear and controlgear – Part 7: Ancillary equipment – Section 2: Protective conductor terminal blocks for copper conductors*

IEC 61000-4-1:1992, *Electromagnetic compatibility (EMC) – Part 4: Testing and measurement techniques – Section 1: Overview of immunity tests* – Basic EMC publication

IEC 61000-4-4:1995, *Electromagnetic compatibility (EMC) – Part 4: Testing and measurement techniques – Section 4: Electrical fast transient/burst immunity test* – Basic EMC Publication

IEC 61000-4-12:1995, *Electromagnetic compatibility (EMC) – Part 4: Testing and measurement techniques – Section 12: Oscillatory waves immunity test* – Basic EMC Publication

IEC 61000-4-17:1999, *Electromagnetic compatibility (EMC) – Part 4-17: Testing and measurement techniques – Ripple on d.c. input power port 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 ports, immunity tests* [1)]

IEC 61000-5 (all parts), *Electromagnetic compatibility (EMC) – Part 5: Installation and mitigation guidelines*

IEC 61000-5-1:1996, *Electromagnetic compatibility (EMC) – Part 5: Installation and mitigation guidelines – Section 1: General considerations* – Basic EMC publication

IEC 61000-5-2:1997, *Electromagnetic compatibility (EMC) – Part 5: Installation and mitigation guidelines – Section 2: Earthing and cabling*

IEC 61000-6-5:—, *Electromagnetic compatibility (EMC) – Part 6-5: Generic standards – Immunity for power station and substation environments* [1)]

1) To be published.

IEC 61020-4:1991, *Electromechanical switches for use in electronic equipment – Part 4: Sectional specification for lever (toggle) switches*

IEC 61166:1993, *High-voltage alternating current circuit-breakers – Guide for seismic qualification of high-voltage alternating current circuit-breakers*

IEC 61180-1:1992, *High-voltage test techniques for low-voltage equipment – Part 1: Definitions, test and procedure requirements*

IEC 61634:1995, *High-voltage switchgear and controlgear – Use and handling of sulphur hexafluoride (SF_6) in high-voltage switchgear and controlgear*

IEC 61810 (all parts), *Electromechanical non-specified time all-or-nothing relays*

IEC 61810-1:1998, *Electromechanical non-specified time all-or-nothing relays – Part 1: General requirements*

IEC 61810-7:1997, *Electromechanical all-or-nothing relays – Part 7: Tests and measurement procedures*

CISPR 11:1990, *Limits and methods of measurement of electromagnetic disturbance characteristics of industrial, scientific and medical (ISM) radio-frequency equipment*

CISPR 16-1:1993, *Specification for radio disturbance and immunity measuring apparatus and methods – Part 1: Radio disturbance and immunity measuring apparatus*

CISPR 18-2:1986, *Radio interference characteristics of overhead power lines and high-voltage equipment – Part 2: Methods of measurement and procedure for determining limits*
Amendment 1 (1993)

Other International Standards are referred to for information in this standard. They are listed in annex G.

2 Normal and special service conditions

Unless otherwise specified, high-voltage switchgear and controlgear, including the operating devices and the auxiliary equipment which form an integral part of them, are intended to be used in accordance with their rated characteristics and the normal service conditions listed in 2.1.

If the actual service conditions differ from these normal service conditions, high-voltage switchgear and controlgear and associated operating devices and auxiliary equipment shall be designed to comply with any special service conditions required by the user, or appropriate arrangements shall be made (see 2.2).

NOTE 1 Appropriate action should also be taken to ensure proper operation under such conditions of other components, such as relays.

NOTE 2 Detailed information concerning classification of environmental conditions is given in IEC 60721-3-3 (indoor) and IEC 60721-3-4 (outdoor).