

INTERNATIONAL STANDARD

NORME INTERNATIONALE



**High-voltage switchgear and controlgear –
Part 102: Alternating current disconnectors and earthing switches**

**Appareillage à haute tension –
Partie 102: Sectionneurs et sectionneurs de terre à courant alternatif**

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

HIGH-VOLTAGE SWITCHGEAR AND CONTROLGEAR –

**Part 102: Alternating current disconnectors
and earthing switches**

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The technical content is therefore identical to the base edition and its amendment and has been prepared for user convenience. A vertical line in the margin shows where the base publication has been modified by amendment 1. Additions and deletions are displayed in red, with deletions being struck through.

International Standard IEC 62271-102 has been prepared by subcommittee 17A: High-voltage switchgear and controlgear, of IEC technical committee 17: Switchgear and controlgear.

The bilingual version (2003-08) corresponds to the monolingual English version, published in 2001-12.

The French version of this standard has not been voted upon.

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

Annex D is for information only.

This standard should be read in conjunction with IEC 60694, second edition, published in 1996, to which it refers and which is applicable, unless otherwise specified. In order to simplify the indication of corresponding requirements, the same numbering of clauses and subclauses is used as in IEC 60694. Additional subclauses are numbered from 101.

The committee has decided that the contents of the base publication and its amendments will remain unchanged until the stability date indicated on the IEC web site under "<http://webstore.iec.ch>" in the data related to the specific publication. At this date, the publication will be

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In accordance with the decision taken at the joint SC 17A/SC 17C meeting in Frankfurt, June 1998 (item 20.7 of 17A/535/RM), a common numbering system has been established for the publications falling under the responsibility of SC 17A and SC 17C. IEC 62271 – *High-voltage switchgear and controlgear* is the publication number and main title element for the common publications.

The numbering of these publications will apply the following principle.

- a) Common standards prepared by SC 17A and SC 17C will start with IEC 62271-1.
- b) Standards of SC 17A will start with IEC 62271-100.
- c) Standards of SC 17C will start with number IEC 62271-200.
- d) Publications prepared by SC 17A and SC 17C will start with number IEC 62271-300.

The table below relates the new numbers to the old numbers. The parts numbered (xxx) will be given a final number pending the decision to publish the revised publication as standard or technical report.

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IEC 62271 series	HIGH-VOLTAGE SWITCHGEAR AND CONTROLGEAR –	Old IEC number, if any
Part	New title	
1	Common specifications	IEC 60694
2	Seismic qualification for rated voltages of 72,5 kV and above	-
100	High-voltage alternating current circuit-breakers	IEC 60056
101	Synthetic testing	IEC 60427
102	High-voltage alternating current disconnectors and earthing switches	IEC 60129
103	Switches for rated voltages above 1 kV and less than 52 kV	IEC 60265-1
104	Switches for rated voltages of 52 kV and above	IEC 60265-2
105	Alternating current switch-fuse combinations	IEC 60420
106	Alternating current contactors and contactor-based motor starters	IEC 60470
107	Alternating current switchgear-fuse combinations	-
108	Switchgear having combined functions	-
109	Series capacitor by-pass switches	-
200	AC metal-enclosed switchgear and controlgear for rated voltages above 1 kV and up to and including 52 kV	IEC 60298
201	Insulation-enclosed switchgear and controlgear for rated voltages up to and including 52 kV	IEC 60466
202	High-voltage/low-voltage prefabricated substations	IEC 61330
203	Gas-insulated metal-enclosed switchgear for rated voltages above 52 kV	IEC 60517
204	High-voltage gas-insulated transmission lines for rated voltages of 72,5 kV and above	IEC 61640
(300)	Guide for seismic qualification of high-voltage alternating current circuit-breakers	IEC 61166
(301)	Guide for inductive load switching	IEC 61233
(302)	Guide for short-circuit and switching test procedures for metal-enclosed and dead tank circuit-breakers	IEC 61633
(303)	Use and handling of sulphur hexafluoride (SF ₆) in high-voltage switchgear and controlgear	IEC 61634
(304)	Additional requirements for enclosed switchgear and controlgear from 1 kV to 72,5 kV to be used in severe climatic conditions	IEC 60932
(305)	Cable connections for gas-insulated metal-enclosed switchgear for rated voltages above 52 kV	IEC 60859
(306)	Direct connection between power transformers and gas-insulated metal-enclosed switchgear for rated voltages above 52 kV	IEC 61639
(307)	Use of electronic and associated technologies in auxiliary equipment of switchgear and controlgear	IEC 62063
308	Guide for asymmetrical short-circuit breaking test duty T100a	-
309	TRV parameters for high-voltage switchgear and controlgear for rated voltages above 1 kV and less than 100 kV	-
310	Electrical endurance testing for circuit-breakers rated 72,5 kV and above	-

HIGH-VOLTAGE SWITCHGEAR AND CONTROLGEAR –

Part 102: Alternating current disconnectors and earthing switches

1 General

1.1 Scope

This part of IEC 62271 applies to alternating current disconnectors and earthing switches, designed for indoor and outdoor enclosed and open terminal installations for voltages above 1 000 V and for service frequencies up to and including 60 Hz.

It also applies to the operating devices of these disconnectors and earthing switches and their auxiliary equipment.

Additional requirements for disconnectors and earthing switches in enclosed switchgear and controlgear are given in IEC 60298, IEC 60466 and IEC 60517.

NOTE Disconnectors in which the fuse forms an integral part are not covered by this standard.

1.2 Normative references

Subclause 1.2 of IEC 60694 is applicable with the following additions:

IEC 60137:1995, *Insulating bushings for alternating voltages above 1 000 V*

IEC 60265-1:1998, *High-voltage switches – Part 1: Switches for rated voltages above 1 kV and less than 52 kV*

IEC 60265-2:1998, *High-voltage switches – Part 2: High-voltage switches for rated voltages of 52 kV and above*

IEC 60298:1990, *A.C. metal-enclosed switchgear and controlgear for rated voltages above 1 kV and up to and including 52 kV*

IEC 60466:1987, *A.C. insulation-enclosed switchgear and controlgear for rated voltages above 1 kV and up to and including 38 kV*

IEC 60517:1990, *Gas-insulated metal-enclosed switchgear for rated voltages of 72,5 kV and above*

IEC 60694:1996, *Common specifications for high-voltage switchgear and controlgear standards*

IEC 60865-1:1993, *Short-circuit currents – Calculation of effects – Part 1: Definitions and calculation methods*

IEC 62271-1:2007, *High-voltage switchgear and controlgear – Part 1: Common specifications*

IEC 62271-100:2008, *High-voltage switchgear and controlgear – Part 100: Alternating-current circuit-breakers*

ISO 2768-1:1989, *General tolerances – Part 1: Tolerances for linear and angular dimensions without individual tolerance indications*

2 Normal and special service conditions

Clause 2 of IEC 60694 is applicable.

3 Definitions

Clause 3 of IEC 60694 is applicable with the following additions:

This clause covers required definitions, most of them by reference to IEC 60050(151), IEC 60050(441) and IEC 60050(604).

3.1 General terms

3.1.101 indoor switchgear and controlgear

[IEV 441-11-04]

3.1.102 outdoor switchgear and controlgear

[IEV 441-11-05]

3.1.103 temperature rise (of a part of a disconnecter or earthing switch)

difference between the temperature of the part and the ambient air temperature

3.1.104 user

person or legal entity using the disconnecters or earthing switches

NOTE This may include the purchaser (for example an electricity supplier), but it may also include the contracting company, the staff responsible for installation, the maintenance or operating staff or anybody else temporarily or permanently responsible for the disconnecter, earthing switch or substation, or even the operation of the switchgear.

3.2 Assemblies of switchgear and controlgear

No particular definitions.

3.3 Parts of assemblies

No particular definitions.

3.4 Switching devices

3.4.101 disconnecter

IEV 441-14-05 is applicable with the following additional notes:

~~NOTE 1 "Negligible current" implies currents such as the capacitive currents of bushings, busbars, connections, very short lengths of cable, currents of permanently connected grading impedances of circuit-breakers and currents of voltage transformers and dividers. For rated voltages of 420 kV and below, a current not exceeding 0,5 A is a negligible current for the purpose of this definition; for rated voltage above 420 kV and currents exceeding 0,5 A, the manufacturer should be consulted.~~

~~"No significant change in voltage" refers to such applications as the by-passing of induction voltage regulators or circuit-breakers.~~

~~NOTE 2 For a disconnecter having a rated voltage of 52 kV and above, a rated ability of bus-transfer current switching may be assigned.~~

NOTE 1 "Negligible current" implies currents such as the capacitive currents of bushings, busbars, connections, very short lengths of cable, currents of permanently connected grading impedances of circuit-breakers and currents of voltage transformers and dividers (see also IEC 62271-305). For rated voltages of 420 kV and below, a current not exceeding 0,5 A is a negligible current for the purpose of this definition; for rated voltage above 420 kV and currents exceeding 0,5 A, the manufacturer should be consulted. "No significant change in voltage" refers to such applications as the by-passing of induction voltage regulators or circuit-breakers and bus transfer.

NOTE 2 For a disconnector having a rated voltage of 52 kV and above, a rated ability of bus transfer current switching may be assigned.

3.4.101.1

disconnecter class M0

disconnecter having a mechanical endurance of 1 000 operating cycles, suitable for applications in distribution and transmission systems fulfilling the general requirements of this standard

3.4.101.2

disconnecter class M1

disconnecter having an extended mechanical endurance of 2 000 operating cycles, mainly for applications where the disconnector is operated in conjunction with a circuit-breaker of an equal class

3.4.101.3

disconnecter class M2

disconnecter having an extended mechanical endurance of 10 000 operating cycles, mainly for applications where the disconnector is operated in conjunction with a circuit-breaker of an equal class

3.4.102

divided support disconnector (earthing switch)

[IEV 441-14-06(07)]

NOTE Examples are pantograph and semi-pantograph disconnectors.

3.4.103

centre-break disconnector

[IEV 441-14-08]

3.4.104

double-break disconnector

[IEV 441-14-09]

3.4.105

earthing switch

IEV 441-14-11 is applicable with the following additional notes:

~~NOTE An earthing switch having a rated voltage of 52 kV and above may have a rating for switching and carrying induced currents.~~

~~Classes E1, E2 and E3 of IEC 60265-1 are based on electrical endurance of switches and switch-disconnectors. These devices may sometimes be operated against a short-circuit as a normal operation duty and the electrical endurance may be the measure of "low maintenance".~~

~~NOTE 101 An earthing switch having a rated voltage of 52 kV and above may have a rating for switching and carrying induced currents.~~

~~NOTE 102 These devices may sometimes be operated against short-circuit. The different classes of earthing switches are related to the number of short-circuit making operations.~~

~~NOTE 103 For special applications such as fault initiating earthing switches the test procedures and the number of tests may be agreed upon between the manufacturer and the user.~~

3.4.105.1**earthing switch class E0**

earthing switch suitable for applications in distribution and transmission systems fulfilling the general requirements of this standard, **without a short-circuit making capability**

3.4.105.2**earthing switch class E1**

~~earthing switch class E0 with a short-circuit making capability~~ earthing switch suitable for applications in distribution and transmission systems fulfilling the general requirements of this standard, with the capability to withstand two short-circuit making operations

NOTE This class of earthing switch is able to withstand two making operations at rated making current.

3.4.105.3**earthing switch class E2 (for earthing switches up to and including 52 kV)**

~~earthing switch of class E1 requiring minimal maintenance, capable of an extended number of short-circuit making operations suitable for applications in systems up to and including 52 kV~~

~~NOTE This class of earthing switch proves its reduced maintenance requirements by a number of five making operations at rated making current, but also requires minimal maintenance as lubrication (replenishment of gas and cleaning of external surfaces where applicable).~~

earthing switch suitable for applications in distribution and transmission systems fulfilling the general requirements of this standard, with the capability to withstand five short-circuit making operations

NOTE The increased number of making operations in Class E2 is restricted to voltages up to and including 52 kV only depending on the operating conditions and the protection systems typical to such networks

3.4.105.4**earthing switch class M0 (for earthing switches)**

earthing switch suitable for applications in distribution and transmission systems fulfilling the general requirements of this standard, with the capability to withstand 1 000 operating cycles

3.4.105.5**combined function earthing switch**

earthing switch having a common contact system for earthing and at least one of the following functions:

- disconnecting;
- making and/or breaking of load currents;
- making and/or breaking of currents up to the rated short-circuit current

3.4.105.6**toggle point**

point beyond which any further movement of the charging mechanism causes the stored energy to be released

3.5 Parts of switching devices**3.5.101****pole of a switching device**

[IEV 441-15-01]

3.5.102**main circuit (of a switching device)**

[IEV 441-15-02]

3.5.103**contact (of a mechanical switching device)**

[IEV 441-15-05]