SLOVENSKI STANDARD
SIST EN 62271-100:2009/A2:2017

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Visokonapetostne stikalne in krmilne naprave - 100. del: Izmenični odklopniki - Dopolnilo A2 (IEC 62271-100:2008/A2:2017)

High-voltage switchgear and controlgear - Part 100: Alternating-current circuit-breakers (IEC 62271-100:2008/A2:2017)

Hochspannungs-Schaltgeräte und -Schaltanlagen - Teil 100: Wechselstrom-Leistungsschalter (IEC 62271-100:2008/A2:2017)

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Appareillage à haute tension - Partie 100: Disjoncteurs à courant alternatif (IEC 62271-100:2008/A2:2017)

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Ta slovenski standard je istoveten z: **EN 62271-100:2009/A2:2017**

ICS:

29.130.10	Visokonapetostne stikalne in krmilne naprave	High voltage switchgear and controlgear

SIST EN 62271-100:2009/A2:2017 **en**

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EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

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English Version

High-voltage switchgear and controlgear - Part 100: Alternating-current circuit-breakers (IEC 62271-100:2008/A2:2017)

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This amendment A2 modifies the European Standard EN 62271-100:2009; it was approved by CENELEC on 2017-07-20. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this amendment the status of a national standard without any alteration.

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European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

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European foreword

The text of document 17A/1135/FDIS, future edition of IEC 62271-100:2009/A2, prepared by SC 17A "High-voltage switchgear and controlgear" of IEC/TC 17 "Switchgear and controlgear" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 62271-100:2009/A2:2017.

The following dates are fixed:

• latest date by which the document has to be implemented at national level by publication of an identical national standard or by endorsement	(dop)	2018-04-20
• latest date by which the national standards conflicting with the document have to be withdrawn	(dow)	2020-07-20

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CENELEC shall not be held responsible for identifying any or all such patent rights.

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The text of the International Standard IEC 62271-100:2009/A2:2017 was approved by CENELEC as a European Standard without any modification.

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Annex ZA
(normative)
Normative references to international publications with their corresponding European publications

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

NOTE 1 When an International Publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

NOTE 2 Up-to-date information on the latest versions of the European Standards listed in this annex is available here: www.cenelec.eu.

Publication	Year	Title	EN/HD	Year
IEC 60137	2008	Insulated bushings for alternating voltages above 1 000 V	EN 60137	2008
IEC 60270	-	High-voltage test techniques - Partial discharge measurements	EN 60270	-

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AMENDMENT 2
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FOREWORD

This amendment has been prepared by subcommittee 17A: Switching devices, of IEC technical committee 17: High-voltage switchgear and controlgear.

The text of this amendment is based on the following documents:

FDIS	Report on voting
17A/1135/FDIS	17A/1139/RVD

Full information on the voting for the approval of this amendment can be found in the report on voting indicated in the above table.

The committee has decided that the contents of this amendment and the base publication 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

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

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IMPORTANT – The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

INTRODUCTION to the Amendment

This amendment includes the following significant technical changes:

– the rated TRV has been replaced by a rated first-pole-to-clear factor;

– the rated time quantities have been moved to Clause 5 (Design and construction) and are no longer ratings. The determination of the break time has been moved to IEC 62271-306;

– the number of test specimens has been removed;

– new test procedure for test-duty T100a;

– TRVs for circuit-breakers having a rated voltage of 52 kV and below used in effectively earthed neutral systems have been added;

– 6.111 (capacitive current switching) has been rewritten;

– a number of informative annexes have been moved to IEC TR 62271-306.

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1.1 Scope

Add, after the third existing paragraph, the following paragraph:

This standard only covers direct testing.

1.2 Normative references

Replace, in the existing list, the reference to IEC 60137 by the following new reference:

IEC 60137:2008, *Insulated bushings for alternating voltages above 1 000 V*

Add, to the existing list, the following reference:

IEC 60270, *High-voltage test techniques – Partial discharge measurements*

3 Terms and definitions

3.1.132
cable system

*Replace the existing references to "*Table 1*" (2 occurrences) to "*Tables 24 and 44*".*

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3.1.133
line system

Replace the existing definition by the following new definition, without modifying the notes.

system in which the TRV during breaking of terminal fault at 100 % of short-circuit breaking current does not exceed the two-parameter envelope derived from Tables 25 and 45 of this standard

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Add, after the existing definition 3.1.133, the following new terms and definitions:

3.1.134
belted cable

multi-conductor cable in which part of the insulation is applied to each conductor individually, and the remainder is applied over the assembled cores

[IEV 461-06-11]

3.1.135
individually screened cable
radial field cable

cable in which each core is covered with an individual screen

[IEV 461-06-12]

3.4.120
circuit-breaker class S2

Replace the existing definition by the following new definition:

circuit-breaker used in a line-system

Add, after definition 3.4.120, the following new term and definition:

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3.4.121
current chopping
current interruption prior to the natural power frequency current zero of the circuit connected

3.7.133
opening time

Replace the existing term, definition and notes as follows:

opening time (of a mechanical switching device)

[IEV 441-17-36]

3.7.134
arcing time (of a multipole switching device)

Replace the existing term, definition and source as follows:

arcing time (of a pole)
interval of time between the instant of the initiation of an arc in a pole and the instant of final arc extinction in that pole

[IEV 441-17-37]

3.7.135
break-time

Replace the existing definition by the following:

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interval of time between the beginning of the opening time of a mechanical switching device and the end of the total arcing time

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[IEV 441-17-39, modified]

3.7.136
closing time

Add, after the existing definition, the following new source:

[IEV 441-17-41, modified]

3.7.137
make time

Replace the source of the definition as follows:

[IEV 441-17-40, modified]

3.7.140
dead time (during auto-reclosing)

Add, after the existing note, the following source:

[IEV 441-17-44, modified]

3.7.144
make-break time

Replace the existing definition together with the notes by the following:

interval of time between the initiation of current flow in the first pole during a closing operation and the end of the total arcing time during the subsequent opening operation

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[IEV 441-17-43, modified]

3.7.159
minimum clearing time

Replace the definition and note as follows:

sum of the minimum opening time, minimum relay time (0,5 cycle) and the shortest arcing time of a minor loop interruption in the phase with intermediate asymmetry that starts with a minor loop at short-circuit current initiation

NOTE 1 This definition is applicable only for the determination of the test parameters during short-circuit breaking tests according to test duty T100a.

NOTE 2 For testing purposes the minimum arcing time found during test-duty T100s is used.

Add, after the existing definition 3.7.160 added by Amendment 1, the following new terms and definitions:

3.7.161
initiation of (opening or closing) operation
instant of receipt of command for operation at the control circuit

3.7.162
total arcing time
interval of time between the instant of the first initiation of an arc in a pole and the instant of arc extinction in all poles

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3.7.163
direct connection to an overhead line
connection between a circuit-breaker and an overhead line having a capacitance less than 5 nF

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NOTE When the cable capacitance per unit length is 0,3 nF/m, it corresponds to a length of cable shorter than approximately 17 m. For further information see IEC TR 62271-306.

3.8 Index of definitions

Add, to the existing alphabetical list, the following new lines:

4 Ratings

Replace item l) by the following new item:

l) rated first-pole-to-clear factor;

Replace the existing item o) by the following new item:

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o) void.

Replace item q) by the following new item:

q) rated line-charging breaking current, for circuit-breakers switching overhead transmission lines (mandatory for circuit-breakers of rated voltages above 52 kV and circuit-breakers of class S2);

Delete the existing item r) from the end of the second existing list, and place it at the beginning of the third existing list before item s).

4.10 Rated pressures of compressed gas supply for insulation, operation and/or interruption

Replace the title by the following:

4.10 Rated pressure of compressed gas supply for controlled pressure systems

Add, between subclauses 4.10 and 4.101, the following new subclause 4.11:

4.11 Rated filling levels for insulation and/or operation

Subclause 4.11 of IEC 62271-1 is applicable.

4.101 Rated short-circuit breaking current (I_{sc})

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Replace, in the first paragraph, "4.102" *by* "6.104.5.1" *and* "4.105" *by* "6.109.3".

4.102 Transient recovery voltage related to the rated short-circuit breaking current

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Replace the complete subclause modified by Amendment 1 including Tables 1 to 7 by the following:

4.102 Rated first-pole-to-clear factor

The first-pole-to-clear factor (k_{pp}) is a function of the earthing of the system neutral. The rated values of k_{pp} are:

– 1,2 for terminal fault breaking by circuit-breakers with rated voltages higher than 800 kV in effectively earthed neutral systems;

– 1,3 for terminal fault breaking by circuit-breakers for rated voltages up to and including 800 kV in effectively earthed neutral systems;

– 1,5 for terminal fault breaking by circuit-breakers for rated voltages less than 245 kV in non-effectively earthed neutral systems.

In this standard, it is considered that circuit-breakers with rated voltages up to and including 170 kV can be either in effectively earthed neutral systems or in non-effectively earthed neutral systems. Circuit-breakers with rated voltages higher than 170 kV are in effectively-earthed systems.

NOTE The following associated first-pole-to-clear factors for out-of-phase conditions are not ratings:

– 2,0 for breaking in out-of-phase conditions in systems with effectively earthed neutral;

– 2,5 for breaking in out-of-phase conditions in systems with non-effectively earthed neutral.

4.105 Characteristics for short-line faults

Replace the title and text modified by Amendment 1 of the complete subclause, including Table 8, by the following:

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4.105 Short-line fault breaking capability

A short-line fault breaking capability is required for circuit-breakers with a rated short-circuit breaking current exceeding 12,5 kA for direct connection to overhead lines.

4.106 Rated out-of-phase making and breaking current

Replace the existing text by the following:

The rated out-of-phase breaking current is the maximum out-of-phase current that the circuit-breaker shall be capable of breaking under the conditions of use and behaviour prescribed in this standard in a circuit having a recovery voltage as specified below.

The specification of a rated out-of-phase making and breaking current is not mandatory.

If a rated out-of-phase breaking current is assigned, the rated out-of-phase breaking current shall be 25 % of the rated short-circuit breaking current and the rated out-of-phase making current shall be the crest value of the rated out-of-phase breaking current, unless otherwise specified.

The standard conditions of use with respect to the rated out-of-phase making and breaking current are as follows:

– opening and closing operations carried out in conformity with the instructions given by the manufacturer for the operation and proper use of the circuit-breaker and its auxiliary equipment;
– earthing condition of the neutral for the power system corresponding to that for which the circuit-breaker has been tested;
– absence of a fault on either side of the circuit-breaker.

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4.107.1 Rated line-charging breaking current

Replace the text by the following:

The rated line-charging breaking current is the line-charging current up to which the circuit-breaker shall be capable of breaking at its rated voltage under the conditions of use and behaviour prescribed in this standard. The associated restrike class (C1 or C2) shall be assigned when a line-charging breaking current is assigned.

4.107.2 Rated cable-charging breaking current

Replace the text by the following:

The rated cable-charging breaking current is the cable-charging current up to which the circuit-breaker shall be capable of breaking at its rated voltage under the conditions of use and behaviour prescribed in this standard. The associated restrike class (C1 or C2) shall be assigned when a cable-charging breaking current is assigned.

4.107.3 Rated single capacitor bank breaking current

Replace the first paragraph by the following:

The rated single capacitor bank breaking current is the single capacitor bank breaking current up to which the circuit-breaker shall be capable of breaking at its rated voltage under the conditions of use and behaviour prescribed in this standard. This breaking current refers to the switching of a shunt capacitor bank where no shunt capacitors are connected to the source side of the circuit-breaker. The associated restrike class (C1 or C2) shall be assigned when a single capacitor bank breaking current is assigned.

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Table 9 – Preferred values of rated capacitive switching currents

In NOTE 2 to the table replace "Annex H" *by* "IEC TR 62271-306"*.*

4.107.4 Rated back-to-back capacitor bank breaking current

Replace the first paragraph by the following:

The rated back-to-back capacitor bank breaking current is the back-to-back capacitor bank current up to which the circuit-breaker shall be capable of breaking at its rated voltage under the conditions of use and behaviour prescribed in this standard. The associated restrike class (C1 or C2) shall be assigned when a back-to-back capacitor bank breaking current is assigned.

4.107.6 Rated back-to-back capacitor bank inrush making current

Replace the existing text by the following:

The rated back-to-back capacitor bank inrush making current is the peak value of the current that the circuit-breaker shall be capable of making at its rated voltage and with a frequency of the inrush current during a simultaneous three-phase making operation (see Table 9).

4.109 Rated time quantities

Replace the title and text of the subclause, including 4.109.1 modified by Amendment 1, by the following:

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4.109 Void.

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Delete the entire subclause and title, including 4.109.1 modified by Amendment 1.

5.4 Auxiliary equipment

Delete, in the second dashed paragraph and in Note 2 the word "rated"*.*

5.5 Dependent power closing

Replace the title by the following:

5.5 Dependent power operation

5.6 Stored energy closing

Replace the title by the following:

5.6 Stored energy operation

5.7 Independent manual operation

Replace the title by the following:

5.7 Independent manual or power operation

5.101 Requirements for simultaneity of poles during single closing and single opening operations

Replace the entire text of this subclause by the following:

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The following requirements are applicable under rated conditions of the auxiliary and control voltage and pressure for operation:

– The maximum difference between the instants of contacts touching during closing in the individual poles shall not exceed a quarter of a cycle of rated frequency. If one pole consists of more than one interrupter unit connected in series, the maximum difference between the instants of contacts touching within these series connected interrupter units shall not exceed one sixth of a cycle of rated frequency. Where closing resistors are used, the maximum difference between the instants of contacts touching during closing in the individual closing resistors shall not exceed one half cycle of rated frequency. If on one pole more than one individual closing resistor is used, each assigned to one of the interrupter units which are connected in series, the maximum difference between the instants of contacts touching within these series connected closing resistors shall not exceed one third of a cycle of rated frequency;
– The maximum difference between the instants of contacts separating during opening shall not exceed one sixth of a cycle of rated frequency. If one pole consists of more than one interrupter unit connected in series, the maximum difference between the instants of contact separation within these series connected interrupter units shall not exceed one eighth of a cycle of rated frequency.

NOTE For a circuit-breaker having separate poles, the requirement is applicable when these operate in the same conditions; after a single-pole reclosing operation the conditions of operation for the three mechanisms may not be the same.

Add, after 5.104, the new subclauses and the new table as follows:

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5.105 Time quantities

Refer to Figures 1, 2, 3, 4, 5, 6 and 7.

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Values may be assigned to the following time quantities:

– opening time (no-load);
– break-time;
– closing time (no-load);
– open-close time (no-load);
– reclosing time (no-load);
– close-open time (no-load);
– pre-insertion time (no-load).

Time quantities are based on

– rated supply voltages of closing and opening devices and of auxiliary and control circuits (see 4.8);
– rated supply frequency of closing and opening devices and of auxiliary circuits (see 4.9);
– rated pressure of compressed gas supply for controlled pressure systems (see 4.10);
– rated filling levels for insulation and/or operation (see 4.11);
– an ambient air temperature of 20 °C ± 5 °C.

NOTE 1 It is not practical to assign a value of make-time or of make-break time due to the variation of the arcing time and the pre-arcing time.

NOTE 2 The break-time is determined using the calculation method given in IEC TR 62271-306 [4].

5.106 Static mechanical loads

Outdoor circuit-breakers shall be designed to withstand and operate correctly when mechanically loaded by stresses resulting from ice, wind and connected conductors. If required, this capability is demonstrated by means of calculations.