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Hochspannungs-Schaltgeräte und -Schaltanlagen - Teil 101: Synthetische Prüfung (IEC 62271-101:2006)

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High-voltage switchgear and controlgear
Part 101: Synthetic testing
(IEC 62271-101:2006)

Appareillage à haute tension
Partie 101: Essais synthétiques
(CEI 62271-101:2006)

Hochspannungs-Schaltgeräte
und -Schaltanlagen
Teil 101: Synthetische Prüfung
(IEC 62271-101:2006)

This European Standard was approved by CENELEC on 2006-07-01. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CENELEC member.

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CENELEC

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

Central Secretariat: rue de Stassart 35, B - 1050 Brussels

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Foreword

The text of document 17A/753/FDIS, future edition 1 of IEC 62271-101, 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 was approved by CENELEC as EN 62271-101 on 2006-07-01.

This European Standard supersedes EN 60427:2000.

This standard shall be read in conjunction with EN 62271-100:2001. The numbering of the subclauses of Clause 6 is the same as in EN 62271-100. However, not all subclauses of EN 62271-100 are addressed; merely those where synthetic testing has introduced changes.

The following dates were fixed:

– latest date by which the EN has to be implemented at national level by publication of an identical national standard or by endorsement	(dop)	2007-04-01
– latest date by which the national standards conflicting with the EN have to be withdrawn	(dow)	2009-07-01

Annex ZA has been added by CENELEC.

Endorsement notice

The text of the International Standard IEC 62271-101:2006 was approved by CENELEC as a European Standard without any modification.

Annex ZA
(normative)

Normative references to international publications with their corresponding European publications

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

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

Publication	Year	Title	EN/HD	Year
IEC/TS 61633	1995	High-voltage alternating current circuit-breakers - Guide for short-circuit and switching test procedures for metal-enclosed and dead tank circuit-breakers	-	-
IEC 62271-100	2001	High-voltage switchgear and controlgear Part 100: High-voltage alternating-current circuit-breakers	EN 62271-100	2001
IEC/TR 62271-308	2002	High-voltage switchgear and controlgear Part 308: Guide for asymmetrical short-circuit breaking test duty T100a	-	-

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High-voltage switchgear and controlgear –

Part 101:
Synthetic testing

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

HIGH-VOLTAGE SWITCHGEAR AND CONTROLGEAR –

Part 101: Synthetic testing

FOREWORD

1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of 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, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). 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. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
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International Standard IEC 62271-101 has been prepared by subcommittee 17A: High-voltage switchgear and controlgear, of IEC technical committee 17: Switchgear and controlgear.

This first edition cancels and replaces the third edition of IEC 60427 published in 2000. This first edition constitutes a technical revision.

The text of this standard is based on the third edition of IEC 60427 and the following documents:

FDIS	Report on voting
17A/753/FDIS	17A/755/RVD

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

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

This publication shall be read in conjunction with IEC 62271-100. The numbering of the subclauses of Clause 6 is the same as in IEC 62271-100. However, not all subclauses of IEC 62271-100 are addressed; merely those where synthetic testing has introduced changes.

The IEC 62271-100 series consists of the following parts, under the general title *High-voltage switchgear and controlgear:*[1]

Part 100: High-voltage alternating-current circuit-breakers

Part 101: Synthetic testing

Part 102: Alternating current disconnectors and earthing switches

Part 104: Alternating current switches for rated voltages of 52 kV and above

Part 105: Alternating current switch-fuse combinations

Part 107: Alternating current fused circuit-switchers for rated voltages above 1 kV up to and including 52 kV

Part 108: High voltage alternating current disconnecting circuit-breakers for rated voltages of 72,5 kV and above

Part 109: Alternating-current series capacitor by-pass switches

Part 110: Inductive load switching

A list of the other parts belonging to the IEC 62271 series can be found on the IEC website http://www.iec.ch. Further information is available on http://tc17.iec.ch.

The committee has decided that the contents of this publication will remain unchanged until the maintenance result 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.

[1] Some of these parts are still in the process of being developed.

HIGH-VOLTAGE SWITCHGEAR AND CONTROLGEAR –

Part 101: Synthetic testing

1 Scope

This part of IEC 62271 mainly applies to a.c. circuit-breakers within the scope of IEC 62271-100. It provides the general rules for testing a.c. circuit-breakers, for making and breaking capacities over the range of test duties described in 6.102 to 6.111 of IEC 62271-100, by synthetic methods.

NOTE Circuits for the test duties described in 6.111 have not yet been standardized. However, present methods are given in Annex G.

It has been proven that synthetic testing is an economical and technically correct way to test high-voltage a.c. circuit-breakers according to the requirements of IEC 62271-100 and that it is equivalent to direct testing.

The methods and techniques described are those in general use. The purpose of this standard is to establish criteria for synthetic testing and for the proper evaluation of results. Such criteria will establish the validity of the test method without imposing restraints on innovation of test circuitry.

2 Normative references

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

IEC 61633:1995, *High-voltage alternating current circuit-breakers – Guide for short-circuit and switching test procedures for metal-enclosed and dead tank circuit-breakers*

IEC 62271-100:2001, *High-voltage switchgear and controlgear – Part 100: High-voltage alternating current circuit-breakers*

IEC 62271-308:2002, *High-voltage switchgear and controlgear – Part 308: Guide for asymmetrical short-circuit test duty T100a*

3 Terms and definitions

For the purposes of this document, the terms and definitions of IEC 62271-100, as well as the following terms and definitions, apply.

3.1
direct test
test in which the applied voltage, the current and the transient and power-frequency recovery voltages are all obtained from a circuit having a single-power source, which may be a power system or special alternators as used in short-circuit testing stations or a combination of both

3.2
synthetic test
test in which all of the current, or a major portion of it, is obtained from one source (current circuit), and in which the applied voltage and/or the recovery voltages (transient and power frequency) are obtained wholly or in part from one or more separate sources (voltage circuits)

3.3
test circuit-breaker
circuit-breaker under test (see 6.102.2 of IEC 62271-100:2001)

3.4
auxiliary circuit-breaker(s)
circuit-breaker(s) forming part of a synthetic test circuit used to put the test circuit-breaker into the required relation with various circuits

3.5
current circuit
that part of the synthetic test circuit from which all or the major part of the power-frequency current is obtained

3.6
voltage circuit
that part of the synthetic test circuit from which all or the major part of the applied voltage and/or recovery voltage is obtained

3.7
prospective current (of a circuit and with respect to a circuit-breaker)
current that would flow in the circuit if each pole of the test and auxiliary circuit-breakers were replaced by a conductor of negligible impedance

[IEV 441-17-01, modified]

3.8
actual current
current through the test circuit-breaker (prospective current modified by the arc voltage of the test and auxiliary circuit-breakers)

3.9
distortion current
calculated current equal to the difference between the prospective current and the actual current

3.10
post-arc current
current which flows through the arc gap of a circuit-breaker when the current and arc voltage have fallen to zero and the transient recovery voltage has begun to rise

3.11
current-injection method
synthetic test method in which the voltage circuit is applied to the test circuit-breaker before power-frequency current zero

3.12
initial transient making current
ITMC
transient current which flows through the circuit-breaker at the moment of voltage breakdown prior to the initiation of current from the current circuit during making