This is a free 26 page sample. Access the full version online.

NSAI Standards

Irish Standard
I.S. EN 62271-1:2017

High-voltage switchgear and controlgear - Part 1: Common specifications for alternating current switchgear and controlgear

© CENELEC 2017 No copying without NSAI permission except as permitted by copyright law.

I.S. EN 62271-1:2017

Incorporating amendments/corrigenda/National Annexes issued since publication:

The National Standards Authority of Ireland (NSAI) produces the following categories of formal documents:

I.S. xxx: Irish Standard — national specification based on the consensus of an expert panel and subject to public consultation.

S.R. xxx: Standard Recommendation — recommendation based on the consensus of an expert panel and subject to public consultation.

SWiFT xxx: A rapidly developed recommendatory document based on the consensus of the participants of an NSAI workshop.

This document replaces/revises/consolidates the NSAI adoption of the document(s) indicated on the CEN/CENELEC cover/Foreword and the following National document(s):

NOTE: The date of any NSAI previous adoption may not match the date of its original CEN/CENELEC document.

This document is based on:	*Published:*
EN 62271-1:2017	2017-10-27

This document was published under the authority of the NSAI and comes into effect on:	ICS number:
2017-11-14	29.130.10 29.130.99 NOTE: If blank see CEN/CENELEC cover page

NSAI	T +353 1 807 3800	Sales:
1 Swift Square,	F +353 1 807 3838	T +353 1 857 6730
Northwood, Santry	E standards@nsai.ie	F +353 1 857 6729
Dublin 9	W NSAI.ie	W standards.ie

Údarás um Chaighdeáin Náisiúnta na hÉireann

This is a free 26 page sample. Access the full version online.

National Foreword

I.S. EN 62271-1:2017 is the adopted Irish version of the European Document EN 62271-1:2017, High-voltage switchgear and controlgear - Part 1: Common specifications for alternating current switchgear and controlgear

This document does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

For relationships with other publications refer to the NSAI web store.

Compliance with this document does not of itself confer immunity from legal obligations.

In line with international standards practice the decimal point is shown as a comma (,) throughout this document.

This is a free 26 page sample. Access the full version online.

This is a free 26 page sample. Access the full version online.

This page is intentionally left blank

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 62271-1

October 2017

ICS 29.130.10; 29.130.99

Supersedes EN 62271-1:2008

English Version

High-voltage switchgear and controlgear - Part 1: Common specifications for alternating current switchgear and controlgear (IEC 62271-1:2017)

Appareillage à haute tension - Partie 1: Spécifications communes pour appareillage à courant alternatif (IEC 62271-1:2017)

Hochspannungs-Schaltgeräte und -Schaltanlagen - Teil 1: Gemeinsame Bestimmungen für Wechselstrom-Schaltgeräte und -Schaltanlagen (IEC 62271-1:2017)

This is a free 26 page sample. Access the full version online.

This European Standard was approved by CENELEC on 2017-08-16. 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 CEN-CENELEC Management Centre or to any CENELEC member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

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

CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

© 2017 CENELEC All rights of exploitation in any form and by any means reserved worldwide for CENELEC Members.

European foreword

The text of document 17/1033/FDIS, future edition 2 of IEC 62271-1, prepared by IEC/TC 17 "High-voltage switchgear and controlgear" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 62271-1:2017.

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)	2018-05-16
• latest date by which the national standards conflicting with the document have to be withdrawn	(dow)	2020-08-16

This document supersedes EN 62271-1:2008.

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.

Endorsement notice

The text of the International Standard IEC 62271-1:2017 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following notes have to be added for the standards indicated:

IEC 60447	NOTE	Harmonized as EN 60447.
IEC 60721-2-4	NOTE	Harmonized as prEN 60721-2-4 [1)].
IEC 60721-2-2	NOTE	Harmonized as EN 60721-2-2.
IEC 60721-3-3	NOTE	Harmonized as EN 60721-3-3.
IEC 60721-3-4	NOTE	Harmonized as EN 60721-3-4.
IEC 60664-1	NOTE	Harmonized as EN 60664-1.
IEC/TS 62271-304	NOTE	Harmonized as CLC/TS 62271-304.
IEC 62271-207	NOTE	Harmonized as EN 62271-207.
IEC 60721-1	NOTE	Harmonized as EN 60721-1.
IEC 60721-2 (series)	NOTE	Harmonized as EN 60721-2 (series).
IEC 60721-3 (series)	NOTE	Harmonized as EN 60721-3 (series).
IEC 61936-1:2010	NOTE	Harmonized as EN 61936-1:2010.
IEC 61936-1:2010/AMD1:2014	NOTE	Harmonized as EN 61936-1:2010/A1:2014.
IEC 61850 (series)	NOTE	Harmonized as EN 61850 (series).

1) At draft stage.

This is a free 26 page sample. Access the full version online.

IEC 62271-3	NOTE	Harmonized as EN 62271-3.
IEC 60073	NOTE	Harmonized as EN 60073.
IEC 60695-3 (series)	NOTE	Harmonized as EN 60695-3 (series).
IEC 60695-7 (series)	NOTE	Harmonized as EN 60695-7 (series).
IEC 60068-2-17:1994	NOTE	Harmonized as EN 60068-2-17:1994.
CISPR 16-1 (series)	NOTE	Harmonized as EN 55016-1 (series).
IEC 60909-0	NOTE	Harmonized as EN 60909-0.
IEC 60228	NOTE	Harmonized as EN 60228.
IEC 60445	NOTE	Harmonized as EN 60445.
IEC 60947-7-1	NOTE	Harmonized as EN 60947-7-1.
IEC 60947-7-2	NOTE	Harmonized as EN 60947-7-2.
IEC 61810 (series)	NOTE	Harmonized as EN 61810 (series).
IEC 61810-1	NOTE	Harmonized as EN 61810-1.
IEC 61810-2	NOTE	Harmonized as EN 61810-2.
IEC 60947-4-1	NOTE	Harmonized as EN 60947-4-1.
IEC 60947-2	NOTE	Harmonized as EN 60947-2.
IEC 60947-4-2	NOTE	Harmonized as EN 60947-4-2.
IEC 60947-3	NOTE	Harmonized as EN 60947-3.
IEC 60947-5-1	NOTE	Harmonized as EN 60947-5-1.
IEC 60730-2-13	NOTE	Harmonized as EN 60730-2-13.
IEC 60669-1	NOTE	Harmonized as EN 60669-1.
IEC 60730-2-9	NOTE	Harmonized as EN 60730-2-9.
IEC 61020-1	NOTE	Harmonized as EN 61020-1.
IEC 60269-1	NOTE	Harmonized as EN 60269-1.
IEC 60269-2	NOTE	Harmonized as EN 60269-2.
IEC 60034-1	NOTE	Harmonized as EN 60034-1.
IEC 60051-1	NOTE	Harmonized as EN 60051-1.
IEC 60051-2	NOTE	Harmonized as EN 60051-2.
IEC 60051-4	NOTE	Harmonized as EN 60051-4.

This is a free 26 page sample. Access the full version online.

IEC 60051-5	NOTE	Harmonized as EN 60051-5.
IEC 60309-1	NOTE	Harmonized as EN 60309-1.
IEC 60309-2	NOTE	Harmonized as EN 60309-2.
IEC 60130 (series)	NOTE	Harmonized as EN 60130 (series).
IEC 62326-1	NOTE	Harmonized as EN 62326-1.
IEC 60393-1	NOTE	Harmonized as EN 60393-1.
IEC 60081	NOTE	Harmonized as EN 60081.
IEC 60064	NOTE	Harmonized as EN 60064.
IEC 60059	NOTE	Harmonized as EN 60059.
IEC 60068-2 (series)	NOTE	Harmonized as EN 60068-2 (series).

This is a free 26 page sample. Access the full version online.

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

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 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 60038 (mod)	2009	IEC standard voltages	EN 60038	2011
IEC 60050-131	2002	International Electrotechnical Vocabulary (IEV) -- Part 131: Circuit theory	-	-
IEC 60050-151	2001	International Electrotechnical Vocabulary (IEV) -- Part 151: Electrical and magnetic devices	-	-
IEC 60050-192	2015	International electrotechnical vocabulary - Part 192: Dependability	-	-
IEC 60050-351	-	International Electrotechnical Vocabulary - Part 351: Control technology	-	-
+ A1	2000		-	-
IEC 60050-441	1984	International Electrotechnical Vocabulary (IEV) -- Chapter 441: Switchgear, controlgear and fuses	-	-
IEC 60050-551	-	International Electrotechnical Vocabulary (IEV) -- Part 551: Power electronics	-	-
IEC 60050-581	2008	International Electrotechnical Vocabulary - Part 581: Electromechanical components for electronic equipment	-	-
IEC 60050-601	-	International Electrotechnical Vocabulary (IEV) -- Chapter 601: Generation, transmission and distribution of electricity - General	-	-
IEC 60050-605	-	International electrotechnical vocabulary - Chapter 605: Generation, transmission and distribution of electricity - Substations	-	-
IEC 60050-614	2016	International electrotechnical vocabulary - Part 614: Generation, transmission and distribution of electricity - Operation	-	-
IEC 60050-811	-	International electrotechnical vocabulary (IEV) -- Chapter 811: Electric traction	-	-
IEC 60050-826	2004	International Electrotechnical Vocabulary - Part 826: Electrical installations	-	-
IEC 60060-1	2010	High-voltage test techniques -- Part 1: General definitions and test requirements	EN 60060-1	2010
IEC 60068-2-1	2007	Environmental testing -- Part 2-1: Tests - Test A: Cold	EN 60068-2-1	2007
IEC 60068-2-2	2007	Environmental testing -- Part 2-2: Tests - Test B: Dry heat	EN 60068-2-2	2007
IEC 60068-2-30	2005	Environmental testing -- Part 2-30: Tests - Test Db: Damp heat, cyclic (12 h + 12 h cycle)	EN 60068-2-30	2005
IEC 60071-1	2006	Insulation co-ordination -- Part 1: Definitions, principles and rules	EN 60071-1	2006
+ A1	2010		+ A1	2010

This is a free 26 page sample. Access the full version online.

IEC 60071-2	1996	Insulation co-ordination -- Part 2: Application guide	EN 60071-2	1997
IEC 60085	2007	Electrical insulation - Thermal evaluation and designation	EN 60085	2008
IEC 60255-21-1	1988	Electrical relays -- Part 21: Vibration, shock, bump and seismic tests on measuring relays and protection equipment -- Section 1: Vibration tests (sinusoidal)	EN 60255-21-1	1995
IEC 60270	-	High-voltage test techniques - Partial discharge measurements	EN 60270	-
IEC 60296	-	Fluids for electrotechnical applications - Unused mineral insulating oils for transformers and switchgear	EN 60296	-
IEC 60376	-	Specification of technical grade sulfur hexafluoride (SF6) for use in electrical equipment	EN 60376	-
IEC 60480	-	Guidelines for the checking and treatment of sulphur hexafluoride (SF6) taken from electrical equipment and specification for its re-use	EN 60480	-
IEC 60507	-	Artificial pollution tests on high-voltage ceramic and glass insulators to be used on a.c. systems	EN 60507	-
IEC 60512-2-2	-	Connectors for electronic equipment - Tests and measurements -- Part 2-2: Electrical continuity and contact resistance tests - Test 2b: Contact resistance - Specified test current method	EN 60512-2-2	-
IEC 60529	1989	Degrees of protection provided by enclosures (IP Code)	EN 60529	1991
-	-		+ corrigendum May	1993
IEC 60529 AMD 1	1999	Degrees of protection provided by enclosures (IP_code); Amendment_1	-	-
IEC 60529 AMD 2	2013	Degrees of protection provided by enclosures (IP_code); Amendment_2	-	-
IEC 61000-4-4	-	Electromagnetic compatibility (EMC) -- Part 4-4: Testing and measurement techniques - Electrical fast transient/burst immunity test	EN 61000-4-4	-
IEC 61000-4-11	-	Electromagnetic compatibility (EMC) -- Part 4-11: Testing and measurement techniques - Voltage dips, short interruptions and voltage variations immunity tests	EN 61000-4-11	-
IEC 61000-4-17	-	Electromagnetic compatibility (EMC) - Part 4-17: Testing and measurement techniques - Ripple on d.c. input power port immunity test	-	-
IEC 61000-4-18	-	Electromagnetic compatibility (EMC) -- Part 4-18: Testing and measurement techniques - Damped oscillatory wave immunity test	EN 61000-4-18	-
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 port immunity tests	EN 61000-4-29	-
IEC 61000-6-2	-	Electromagnetic compatibility (EMC) - Part 6-2: Generic standards - Immunity standard for industrial environments	EN 61000-6-2	-

This is a free 26 page sample. Access the full version online.

IEC 61000-6-5	-	Electromagnetic compatibility (EMC) - Part 6-5: Generic standards - Immunity for equipment used in power station and substation environment	EN 61000-6-5	-
IEC 61180	-	High-voltage test techniques for low-voltage equipment - Definitions, test and procedure requirements, test equipment	EN 61180	-
IEC 61810-7	2006	Electromechanical elementary relays -- Part 7: Test and measurement procedures	EN 61810-7	2006
IEC 62262	2002	Degrees of protection provided by enclosures for electrical equipment against external mechanical impacts (IK code)	EN 62262	2002
IEC 62271-4	-	High-voltage switchgear and controlgear -- Part 4: Handling procedures for sulphur hexafluoride (SF6) and its mixtures	EN 62271-4	-
IEC/TS 60815-1	2008	Selection and dimensioning of high-voltage insulators intended for use in polluted conditions - Part 1: Definitions, information and general principles	-	-
IEC/TS 60815-2	2008	Selection and dimensioning of high-voltage insulators intended for use in polluted conditions - Part 2: Ceramic and glass insulators for a.c. systems	-	-
IEC/TS 60815-3	2008	Selection and dimensioning of high-voltage insulators intended for use in polluted conditions - Part 3: Polymer insulators for a.c. systems	-	-
CISPR 11 (mod)	2015	Industrial, scientific and medical equipment - Radio-frequency disturbance characteristics - Limits and methods of measurement	EN 55011	2016
CISPR/TR 18-2	-	Radio interference characteristics of overhead power lines and high-voltage equipment - Part 2: Methods of measurement and procedure for determining limits	-	-

This is a free 26 page sample. Access the full version online.

This is a free 26 page sample. Access the full version online.

This page is intentionally left blank

IEC 62271-1

Edition 2.0 2017-07

INTERNATIONAL STANDARD

NORME INTERNATIONALE

High-voltage switchgear and controlgear – Part 1: Common specifications for alternating current switchgear and controlgear

Appareillage à haute tension – Partie 1: Spécifications communes pour appareillage à courant alternatif

This is a free 26 page sample. Access the full version online.

IEC 62271-1:2017-07(en-fr)

This is a free 26 page sample. Access the full version online.

THIS PUBLICATION IS COPYRIGHT PROTECTED
Copyright © 2017 IEC, Geneva, Switzerland

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either IEC or IEC's member National Committee in the country of the requester. If you have any questions about IEC copyright or have an enquiry about obtaining additional rights to this publication, please contact the address below or your local IEC member National Committee for further information.

Droits de reproduction réservés. Sauf indication contraire, aucune partie de cette publication ne peut être reproduite ni utilisée sous quelque forme que ce soit et par aucun procédé, électronique ou mécanique, y compris la photocopie et les microfilms, sans l'accord écrit de l'IEC ou du Comité national de l'IEC du pays du demandeur. Si vous avez des questions sur le copyright de l'IEC ou si vous désirez obtenir des droits supplémentaires sur cette publication, utilisez les coordonnées ci-après ou contactez le Comité national de l'IEC de votre pays de résidence.

IEC Central Office
3, rue de Varembé
CH-1211 Geneva 20
Switzerland

Tel.: +41 22 919 02 11
Fax: +41 22 919 03 00
info@iec.ch
www.iec.ch

About the IEC
The International Electrotechnical Commission (IEC) is the leading global organization that prepares and publishes International Standards for all electrical, electronic and related technologies.

About IEC publications
The technical content of IEC publications is kept under constant review by the IEC. Please make sure that you have the latest edition, a corrigenda or an amendment might have been published.

IEC Catalogue - webstore.iec.ch/catalogue
The stand-alone application for consulting the entire bibliographical information on IEC International Standards, Technical Specifications, Technical Reports and other documents. Available for PC, Mac OS, Android Tablets and iPad.

IEC publications search - www.iec.ch/searchpub
The advanced search enables to find IEC publications by a variety of criteria (reference number, text, technical committee,…). It also gives information on projects, replaced and withdrawn publications.

IEC Just Published - webstore.iec.ch/justpublished
Stay up to date on all new IEC publications. Just Published details all new publications released. Available online and also once a month by email.

Electropedia - www.electropedia.org
The world's leading online dictionary of electronic and electrical terms containing 20 000 terms and definitions in English and French, with equivalent terms in 16 additional languages. Also known as the International Electrotechnical Vocabulary (IEV) online.

IEC Glossary - std.iec.ch/glossary
65 000 electrotechnical terminology entries in English and French extracted from the Terms and Definitions clause of IEC publications issued since 2002. Some entries have been collected from earlier publications of IEC TC 37, 77, 86 and CISPR.

IEC Customer Service Centre - webstore.iec.ch/csc
If you wish to give us your feedback on this publication or need further assistance, please contact the Customer Service Centre: csc@iec.ch.

A propos de l'IEC
La Commission Electrotechnique Internationale (IEC) est la première organisation mondiale qui élabore et publie des Normes internationales pour tout ce qui a trait à l'électricité, à l'électronique et aux technologies apparentées.

A propos des publications IEC
Le contenu technique des publications IEC est constamment revu. Veuillez vous assurer que vous possédez l'édition la plus récente, un corrigendum ou amendement peut avoir été publié.

Catalogue IEC - webstore.iec.ch/catalogue
Application autonome pour consulter tous les renseignements bibliographiques sur les Normes internationales, Spécifications techniques, Rapports techniques et autres documents de l'IEC. Disponible pour PC, Mac OS, tablettes Android et iPad.

Recherche de publications IEC - www.iec.ch/searchpub
La recherche avancée permet de trouver des publications IEC en utilisant différents critères (numéro de référence, texte, comité d'études,…). Elle donne aussi des informations sur les projets et les publications remplacées ou retirées.

IEC Just Published - webstore.iec.ch/justpublished
Restez informé sur les nouvelles publications IEC. Just Published détaille les nouvelles publications parues. Disponible en ligne et aussi une fois par mois par email.

Electropedia - www.electropedia.org
Le premier dictionnaire en ligne de termes électroniques et électriques. Il contient 20 000 termes et définitions en anglais et en français, ainsi que les termes équivalents dans 16 langues additionnelles. Egalement appelé Vocabulaire Electrotechnique International (IEV) en ligne.

Glossaire IEC - std.iec.ch/glossary
65 000 entrées terminologiques électrotechniques, en anglais et en français, extraites des articles Termes et Définitions des publications IEC parues depuis 2002. Plus certaines entrées antérieures extraites des publications des CE 37, 77, 86 et CISPR de l'IEC.

Service Clients - webstore.iec.ch/csc
Si vous désirez nous donner des commentaires sur cette publication ou si vous avez des questions contactez-nous: csc@iec.ch.

IEC 62271-1

Edition 2.0 2017-07

INTERNATIONAL STANDARD

NORME INTERNATIONALE

High-voltage switchgear and controlgear – Part 1: Common specifications for alternating current switchgear and controlgear

Appareillage à haute tension – Partie 1: Spécifications communes pour appareillage à courant alternatif

INTERNATIONAL ELECTROTECHNICAL COMMISSION

COMMISSION ELECTROTECHNIQUE INTERNATIONALE

ICS 29.130.10; 29.130.99

ISBN 978-2-8322-4353-4

Warning! Make sure that you obtained this publication from an authorized distributor.
Attention! Veuillez vous assurer que vous avez obtenu cette publication via un distributeur agréé.

® Registered trademark of the International Electrotechnical Commission
Marque déposée de la Commission Electrotechnique Internationale

This is a free 26 page sample. Access the full version online.

CONTENTS

FOREWORD 8
INTRODUCTION 11
1 Scope 12
2 Normative references 12
3 Terms and definitions 14
3.1 General terms and definitions 15
3.2 Assemblies of switchgear and controlgear 18
3.3 Parts of assemblies 18
3.4 Switching devices 18
3.5 Parts of switchgear and controlgear 18
3.6 Operational characteristics of switchgear and controlgear 22
3.6.5 Terms and definitions relative to pressure (or density) 23
3.6.6 Terms and definitions relating to gas and vacuum tightness 23
3.6.7 Terms and definitions relating to liquid tightness 25
3.7 Characteristic quantities 25
3.8 Index of definitions 26
4 Normal and special service conditions 28
4.1 Normal service conditions 28
4.1.1 General 28
4.1.2 Indoor switchgear and controlgear 28
4.1.3 Outdoor switchgear and controlgear 29
4.2 Special service conditions 29
4.2.1 General 29
4.2.2 Altitude 29
4.2.3 Exposure to pollution 30
4.2.4 Temperature and humidity 30
4.2.5 Exposure to abnormal vibrations, shock or tilting 30
4.2.6 Wind speed 31
4.2.7 Other parameters 31
5 Ratings 31
5.1 General 31
5.2 Rated voltage (U_r) 31
5.2.1 General 31
5.2.2 Range I for rated voltages of 245 kV and below 31
5.2.3 Range II for rated voltages above 245 kV 32
5.3 Rated insulation level (U_d, U_p, U_s) 32
5.4 Rated frequency (f_r) 36
5.5 Rated continuous current (I_r) 36
5.6 Rated short-time withstand current (I_k) 36
5.7 Rated peak withstand current (I_p) 37
5.8 Rated duration of short-circuit (t_k) 37
5.9 Rated supply voltage of auxiliary and control circuits (U_a) 37
5.9.1 General 37
5.9.2 Rated supply voltage (U_a) 37
5.10 Rated supply frequency of auxiliary and control circuits 38
5.11 Rated pressure of compressed gas supply for controlled pressure systems 38

This is a free 26 page sample. Access the full version online.

6 Design and construction 39
6.1 Requirements for liquids in switchgear and controlgear 39
6.2 Requirements for gases in switchgear and controlgear 39
6.3 Earthing of switchgear and controlgear 39
6.4 Auxiliary and control equipment and circuits 39
6.4.1 General 39
6.4.2 Protection against electric shock 40
6.4.3 Components installed in enclosures 40
6.5 Dependent power operation 43
6.6 Stored energy operation 43
6.6.1 General 43
6.6.2 Energy storage in gas receivers or hydraulic accumulators 44
6.6.3 Energy storage in springs (or weights) 44
6.6.4 Manual charging 44
6.6.5 Motor charging 44
6.6.6 Energy storage in capacitors 44
6.7 Independent unlatched operation (independent manual or power operation) 44
6.8 Manually operated actuators 45
6.9 Operation of releases 45
6.9.1 General 45
6.9.2 Shunt closing release 45
6.9.3 Shunt opening release 45
6.9.4 Capacitor operation of shunt releases 45
6.9.5 Under-voltage release 46
6.10 Pressure/level indication 46
6.10.1 Gas pressure 46
6.10.2 Liquid level 46
6.11 Nameplates 46
6.11.1 General 46
6.11.2 Application 46
6.12 Locking devices 48
6.13 Position indication 48
6.14 Degrees of protection provided by enclosures 48
6.14.1 General 48
6.14.2 Protection of persons against access to hazardous parts and protection of the equipment against ingress of solid foreign objects (IP coding) 48
6.14.3 Protection against ingress of water (IP coding) 48
6.14.4 Protection against mechanical impact under normal service conditions (IK coding) 48
6.15 Creepage distances for outdoor insulators 49
6.16 Gas and vacuum tightness 49
6.16.1 General 49
6.16.2 Controlled pressure systems for gas 49
6.16.3 Closed pressure systems for gas 49
6.16.4 Sealed pressure systems 50
6.17 Tightness for liquid systems 50
6.17.1 General 50
6.17.2 Leakage rates 50
6.18 Fire hazard (flammability) 50

This is a free 26 page sample. Access the full version online.

6.19 Electromagnetic compatibility (EMC) 50
6.20 X-ray emission 51
6.21 Corrosion 51
6.22 Filling levels for insulation, switching and/or operation 51
7 Type tests 51
7.1 General 51
7.1.1 Basics 51
7.1.2 Information for identification of test objects 51
7.1.3 Information to be included in type-test reports 52
7.2 Dielectric tests 52
7.2.1 General 52
7.2.2 Ambient air conditions during tests 52
7.2.3 Wet test procedure 53
7.2.4 Arrangement of the equipment 53
7.2.5 Criteria to pass the test 54
7.2.6 Application of the test voltage and test conditions 54
7.2.7 Tests of switchgear and controlgear of $U_r \leq 245$ kV 58
7.2.8 Tests of switchgear and controlgear of $U_r > 245$ kV 58
7.2.9 Artificial pollution tests for outdoor insulators 59
7.2.10 Partial discharge tests 59
7.2.11 Dielectric tests on auxiliary and control circuits 59
7.2.12 Voltage test as condition check 59
7.3 Radio interference voltage (RIV) test 60
7.4 Resistance measurement 60
7.4.1 Measurement of the resistance of auxiliary contacts class 1 and class 2 60
7.4.2 Measurement of the resistance of auxiliary contacts class 3 60
7.4.3 Electrical continuity of earthed metallic parts test 60
7.4.4 Resistance measurement of contacts and connections in the main circuit as a condition check 60
7.5 Continuous current tests 61
7.5.1 Condition of the test object 61
7.5.2 Arrangement of the equipment 61
7.5.3 Test current and duration 62
7.5.4 Temperature measurement during test 63
7.5.5 Resistance of the main circuit 64
7.5.6 Criteria to pass test 64
7.6 Short-time withstand current and peak withstand current tests 68
7.6.1 General 68
7.6.2 Arrangement of the equipment and of the test circuit 68
7.6.3 Test current and duration 69
7.6.4 Conditions of the test object after test 70
7.7 Verification of the protection 70
7.7.1 Verification of the IP coding 70
7.7.2 Verification of the IK coding 70
7.8 Tightness tests 71
7.8.1 General 71
7.8.2 Controlled pressure systems for gas 72
7.8.3 Closed pressure systems for gas 72
7.8.4 Sealed pressure systems 73

This is a free 26 page sample. Access the full version online.

7.8.5 Liquid tightness tests 73
7.9 Electromagnetic compatibility tests (EMC) 73
7.9.1 Emission tests 73
7.9.2 Immunity tests on auxiliary and control circuits 76
7.9.3 Additional EMC tests on auxiliary and control circuits 78
7.10 Additional tests on auxiliary and control circuits 79
7.10.1 General 79
7.10.2 Functional tests 79
7.10.3 Verification of the operational characteristics of auxiliary contacts 79
7.10.4 Environmental tests 80
7.10.5 Dielectric test 81
7.11 X-radiation test for vacuum interrupters 81
7.11.1 General requirements 81
7.11.2 Test voltage and measurement procedure 83
7.11.3 Acceptance criteria 83
8 Routine tests 84
8.1 General 84
8.2 Dielectric test on the main circuit 84
8.3 Tests on auxiliary and control circuits 85
8.3.1 Inspection of auxiliary and control circuits, and verification of conformity to the circuit diagrams and wiring diagrams 85
8.3.2 Functional tests 85
8.3.3 Verification of protection against electrical shock 85
8.3.4 Dielectric tests 85
8.4 Measurement of the resistance of the main circuit 85
8.5 Tightness test 86
8.5.1 General 86
8.5.2 Controlled pressure systems for gas 86
8.5.3 Closed pressure systems for gas 86
8.5.4 Sealed pressure systems 86
8.5.5 Liquid tightness tests 86
8.6 Design and visual checks 86
9 Guide to the selection of switchgear and controlgear (informative) 87
9.1 General 87
9.2 Selection of rated values 87
9.3 Cable-interface considerations 87
9.4 Continuous or temporary overload due to changed service conditions 87
9.5 Environmental aspects 87
9.5.1 Service conditions 87
9.5.2 Clearances affected by service conditions 87
9.5.3 High humidity 87
9.5.4 Solar radiation 88
10 Information to be given with enquiries, tenders and orders (informative) 88
10.1 General 88
10.2 Information with enquiries and orders 88
10.3 Information with tenders 89
11 Transport, storage, installation, operating instructions and maintenance 90
11.1 General 90
11.2 Conditions during transport, storage and installation 90

This is a free 26 page sample. Access the full version online.

11.3 Installation 90
11.3.1 General 90
11.3.2 Unpacking and lifting 90
11.3.3 Assembly 91
11.3.4 Mounting 91
11.3.5 Connections 91
11.3.6 Information about gas and gas mixtures for controlled and closed pressure systems 91
11.3.7 Final installation inspection 92
11.3.8 Basic input data by the user 92
11.3.9 Basic input data by the manufacturer 92
11.4 Operating instructions 93
11.5 Maintenance 93
11.5.1 General 93
11.5.2 Information about fluids and gas to be included in maintenance manual 93
11.5.3 Recommendations for the manufacturer 93
11.5.4 Recommendations for the user 94
11.5.5 Failure report 95
12 Safety 96
12.1 General 96
12.2 Precautions by manufacturers 97
12.3 Precautions by users 97
13 Influence of the product on the environment 97
Annex A (normative) Identification of test objects 99
A.1 General 99
A.2 Data 99
A.3 Drawings 99
Annex B (informative) Determination of the equivalent RMS value of a short-time current during a short-circuit of a given duration 101
Annex C (normative) Method for the weatherproofing test for outdoor switchgear and controlgear 102
Annex D (informative) References for auxiliary and control circuit components 105
Annex E (normative) Tolerances on test quantities during tests 107
Annex F (informative) Information and technical requirements to be given with enquiries, tenders and orders 110
F.1 General 110
F.2 Normal and special service conditions (refer to Clause 4) 110
F.3 Ratings (refer to Clause 5) 111
F.4 Design and construction (refer to Clause 6) 111
F.5 System information 112
F.6 Documentation for enquiries and tenders 112
Annex G (informative) List of symbols 113
Annex H (informative) Electromagnetic compatibility on site 114
Annex I (informative) List of notes concerning certain countries 115
Annex J (informative) Extension of validity of type tests 116
J.1 General 116
J.2 Dielectric tests 116
J.3 Short-time withstand current tests 116

This is a free 26 page sample. Access the full version online.

J.4 Continuous current test 116
J.5 Electromagnetic immunity test on auxiliary and control circuits 117
J.6 Environmental tests on auxiliary and control circuits 117
Annex K (informative) Exposure to pollution 118
K.1 General 118
K.2 Pollution levels 118
K.3 Minimum requirements for switchgear 118
Bibliography 120

Figure 1 – Examples of classes of contacts 43
Figure 2 – Diagram of connections of a three-pole switching device 55
Figure 3 – Diagram of a test circuit for the radio interference voltage test 74
Figure 4 – Test location of radiation survey instrument 83
Figure B.1 – Determination of short-time current 101
Figure C.1 – Arrangement for weatherproofing test 103
Figure C.2 – Nozzle for weatherproofing test 104

Table 1 – Rated insulation levels for rated voltages of range I, series I 33
Table 2 – Rated insulation levels for rated voltages of range I, series II (based on current practice in some countries, including US) 34
Table 3 – Rated insulation levels for rated voltages of range II 35
Table 4 – Additional rated insulation levels for range II, based on current practice in some countries, including US 36
Table 5 – Peak factors for rated peak withstand current 37
Table 6 – Direct current voltage 38
Table 7 – Alternating current voltage 38
Table 8 – Auxiliary contact classes 42
Table 9 – Nameplate information 47
Table 10 – Test conditions in general case 55
Table 11 – Power-frequency test conditions 56
Table 12 – Impulse test conditions 57
Table 13 – Test conditions for the alternative method 57
Table 14 – Limits of temperature and temperature rise for various parts, materials and dielectrics of high-voltage switchgear and controlgear 65
Table 15 – Permissible leakage rates for gas systems 72
Table 16 – Application of voltages at the fast transient/burst test 77
Table 17 – Application of voltage at the damped oscillatory wave test 77
Table 18 – Assessment criteria for transient disturbance immunity 78
Table D.1 – List of reference documents for auxiliary and control circuit components 105
Table E.1 – Tolerances on test quantities for type test 108
Table K.1 – Environmental examples by site pollution severity (SPS) class 119
Table K.2 – Minimum nominal specific creepage distance by pollution level 119

This is a free 26 page sample. Access the full version online.

INTERNATIONAL ELECTROTECHNICAL COMMISSION

_____

HIGH-VOLTAGE SWITCHGEAR AND CONTROLGEAR –

Part 1: Common specifications for alternating current switchgear and controlgear

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.
2) The formal decisions or agreements of 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 IEC National Committees.
3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
6) All users should ensure that they have the latest edition of this publication.
7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 62271-1 has been prepared by technical committee 17: High-voltage switchgear and controlgear.

This second edition cancels and replaces the first edition published in 2007 and Amendment 1:2011. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

New numbering in accordance with ISO/IEC directives, Part 2 (2016) and IEEE Std. C37.100.1.

4.1.2 a) The normal service condition for indoor switchgear is limited to one range of 40 °C to –5 °C.

This is a free 26 page sample. Access the full version online.

4.1.3 a) The normal service condition for outdoor switchgear is limited to one range of 40 °C to –25 °C.

4.2.2: The specifications from IEC 60071-2:1996 are adopted for altitude correction factors above 1 000 m.

5.2.2: Range I, the rated voltage of 40,5 kV is added Series I Table 1; Table 2 and Table 4 are updated on recommendation of the US National Committee.

6.8: New subclause added for manual operated actuators consistent with “Man Machine Interface” recommendations of IEC 60447 [1] [1].

7.2.6.1:Insert the wording regarding preliminary impulses across open vacuum interrupters according to the result of IEC 17/1026/RQ.

7.3: Changed the requirement for radio interference voltage to a rated voltage level of 245 kV and above, instead of 123 kV and above. This change is based on reported positive test and service experience of utility representatives in the maintenance team of this standard.

7.5.6, Table 14:

a) Introduced the distinction of parts in “OG” (oxidizing gas) or in “NOG” (not oxidizing gas) replacing the former “air” and “SF_6”;

b) Increased the allowable temperature rise for some parts in groups 1 and 2 of Table 14 according to IEC TR 60943 [2];

c) Expanded the definition of allowable temperature rise for categories of accessible surfaces with reference to IEC Guide 117 [3]. See also point 15 in 7.5.6.2.

7.5.6.2: Point 5 is modified to clarify the introduction of “OG” and “NOG” gas.

7.10: Some tests were removed because the relevant test standards of IEC 60068 series were modified or withdrawn.

7.11.3: The acceptance criteria for X-radiation testing are modified to recognize higher rated vacuum interrupters.

Former informative Annex H: Corrosion is deleted, the content is part of IEC TR 62271-306 [4].

New Annex J (informative): Added informative guidelines for the extension of validity of type tests

New Annex K (informative): Added informative guidelines about exposure to pollution

The text of this International Standard is based on the following documents:

FDIS	Report on voting
17/1033/FDIS	17/1037/RVD

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

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

The reader’s attention is drawn to the fact that Annex I lists all of the “in-some-country” clauses on differing practices of a less permanent nature relating to the subject of this standard.

1 Numbers in square brackets refer to the Bibliography.

This is a free 26 page sample. Access the full version online.

The list of all parts of the IEC 62271 series under the general title, *High-voltage switchgear and controlgear*, can be found on the IEC website.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under "http://webstore.iec.ch" in the data related to the specific document. At this date, the document will be

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

This is a free 26 page sample. Access the full version online.

INTRODUCTION

In the preparation of this FDIS draft for the general revision of IEC 62271-1:2007 and IEC 62271-1:2007/AMD1:2011, the maintenance team was motivated by the following principles:

– Application of horizontal standards – such application is mandatory for product standards, (reference IEC Guide 108 [5]). A typical example is the application of IEC 60071 (all parts) dealing with insulation coordination.

– Application of the "principle of verifiability" – as defined in the Directives, Part 2, 5.5 (2016) "...Only those requirements which can be verified shall be included.".

– Organizing information in the proper clause, e.g. terms and definitions in Clause 3, rated values in Clause 5. For example, the values of rated continuous current are specified in Clause 5 but the conditions of test and acceptance criteria (e.g. temperature rise limits) are moved to Clause 7.

– Normal service conditions in Clause 4 are unambiguous statements of conditions under which the switchgear and controlgear is expected to operate. For example: "Solar radiation does not exceed a level of 1 000 W/m^2" rather than "Solar radiation up to a level of 1 000 W/m^2 should be considered".

– Ratings in Clause 5 have been limited to reflect the common specifications of the switchgear and controlgear that are specified by the user and are necessary for operation on the user's network. See the last paragraph of 5.1 for addition clarification.

– Statements or informative NOTES that reflect design guides (not requirements) or application (not standard requirements) are either removed or moved to Clause 9.

  For example, the following former NOTE contains both a design guide and an application issue, neither of which belongs to normal service conditions:
  "Under certain levels of solar radiation, appropriate measures, for example roofing, forced ventilation, test simulating solar gain, etc., may be necessary, or derating may be used, in order not to exceed the specified temperature rises and pressure rise limits".

– Specifications for design and construction in Clause 6 have been limited to requirements that can be verified by test or inspection.

– References to tests and procedures that relate to transportation, installation, commissioning and maintenance have been moved to Clause 11.

– Improve wording to minimize the possibility of miss-interpretation or conflicting interpretations of the specifications, methods or criteria.

– Elimination of hanging paragraphs and actual or potential circular references. Reference to ISO/IEC Directives, Part 2, 22.3.3 (2016).

As a result of the application of these principles or objectives, the FDIS draft includes more revisions that might otherwise be expected.

This is a free 26 page sample. Access the full version online.

HIGH-VOLTAGE SWITCHGEAR AND CONTROLGEAR –

Part 1: Common specifications for alternating current switchgear and controlgear

This is a free 26 page sample. Access the full version online.

1 Scope

This part of IEC 62271 applies to AC switchgear and controlgear designed for indoor and/or outdoor installation and for operation at service frequencies up to and including 60 Hz and having rated voltages above 1 000 V.

This document 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.

NOTE For the use of this document, high-voltage is defined as the rated voltage above 1 000 V. However, the term medium voltage is commonly used for distribution systems with voltages above 1 kV and generally applied up to and including 52 kV.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 60038:2009, *IEC standard voltages*

IEC 60050-131:2002, *International Electrotechnical Vocabulary (IEV) – Part 131: Circuit theory*

IEC 60050-151:2001, *International Electrotechnical Vocabulary (IEV) – Part 151: Electrical and magnetic devices*

IEC 60050-192:2015, *International Electrotechnical Vocabulary (IEV) – Part 192: Dependability*

IEC 60050-351, *International Electrotechnical Vocabulary (IEV) – Part 351: Control technology*

IEC 60050-441:1984, *International Electrotechnical Vocabulary (IEV) – Part 441: Switchgear, controlgear and fuses*
IEC 60050-441:1984/AMD1:2000

IEC 60050-551, *International Electrotechnical Vocabulary (IEV) – Part 551: Power electronics*

IEC 60050-581:2008, *International Electrotechnical Vocabulary (IEV) – Part 581: Electromechanical components for electronic equipment*

IEC 60050-601, *International Electrotechnical Vocabulary (IEV) – Chapter 601: Generation, transmission and distribution of electricity – General*

IEC 60050-605, *International Electrotechnical Vocabulary (IEV) – Chapter 605: Generation, transmission and distribution of electricity – Substations*

This is a free 26 page sample. Access the full version online.

This is a free preview. Purchase the entire publication at the link below:

I.S. EN 62271-1 : 2017 : EN : COMBINED PDF

Looking for additional Standards? Visit SAI Global Infostore

Learn about LexConnect, All Jurisdictions, Standards referenced in Australian legislation

Need to speak with a Customer Service Representative - Contact Us