

TNI	Vysokonapäťové spínacie a riadiace zariadenia Časť 307: Návod na rozšírenie rozsahu platnosti typových skúšok rozvádzačov na striedavý prúd s kovovým krytom a s krytom z tuhej izolácie na menovité striedavé napätia nad 1 kV až do 52 kV vrátane	TNI CLC IEC/TR 62271-307 35 4220
------------	--	--

High-voltage switchgear and controlgear - Part 307: Guidance for the extension of validity of type tests of AC metal and solid-insulation enclosed switchgear and controlgear for rated voltages above 1 kV and up to and including 52 kV

Táto technická normalizačná informácia obsahuje anglickú verziu CLC IEC/TR 62271-307:2019, IEC/TR 62271-307:2015.

This Technical standard information includes the English version of CLC IEC/TR 62271-307:2019, IEC/TR 62271-307:2015.

Táto technická normalizačná informácia bola oznámená vo Vestníku ÚNMS SR č. 12/19

130033

TECHNICAL REPORT
RAPPORT TECHNIQUE
TECHNISCHER BERICHT

CLC IEC/TR 62271-307

July 2019

ICS 29.130.10

English Version

**High-voltage switchgear and controlgear - Part 307: Guidance
for the extension of validity of type tests of AC metal and solid-
insulation enclosed switchgear and controlgear for rated
voltages above 1 kV and up to and including 52 kV
(IEC/TR 62271-307:2015)**

Appareillage à haute tension - Partie 307: Lignes directrices
pour l'extension de validité des essais de type
d'appareillages en courant alternatif sous enveloppe
métallique et d'isolation solide pour tensions assignées
supérieures à 1 kV et jusqu'à 52 kV inclus
(IEC/TR 62271-307:2015)

Hochspannungs-Schaltgeräte und -Schaltanlagen - Teil
307: Leitfadens für die Erweiterung des Geltungsbereichs
von Typprüfungen von metall- und isolierstoffgekapselten
Wechselstrom-Schaltanlagen für Bemessungsspannungen
über 1 kV und bis einschließlich 52 kV
(IEC/TR 62271-307:2015)

This Technical Report was approved by CENELEC on 2019-06-17.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, 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: Rue de la Science 23, B-1040 Brussels

CLC IEC/TR 62271-307:2019 (E)**European foreword**

This document (CLC IEC/TR 62271-307:2019) consists of the text of IEC/TR 62271-307:2015 prepared by SC 17C "Assemblies" of IEC/TC 17 "High-voltage switchgear and controlgear".

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/TR 62271-307:2015 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 60865-1	NOTE	Harmonized as EN 60865-1
IEC 60071-1:2006	NOTE	Harmonized as EN 60071-1:2006 (not modified)
IEC 60071-1:2006/A1:2010	NOTE	Harmonized as EN 60071-1:2006/A1:2010 (not modified)

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 Where 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.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 60050-441	1984	International Electrotechnical Vocabulary. - Switchgear, controlgear and fuses	-	-
+ A1	2000		-	-
IEC 62271-1	2007	High-voltage switchgear and controlgear -- Part 1: Common specifications	EN 62271-1	2008
+ A1	2011		+ A1	2011
IEC 62271-200	2011	High-voltage switchgear and controlgear - Part 200: AC metal-enclosed switchgear and controlgear for rated voltages above 1 kV and up to and including 52 kV	EN 62271-200	2012
IEC 62271-201	2014	High-voltage switchgear and controlgear - Part 201: AC solid-insulation enclosed switchgear and controlgear for rated voltages above 1 kV and up to and including 52 kV	EN 62271-201	2014



IEC TR 62271-307

Edition 1.0 2015-09

TECHNICAL REPORT

RAPPORT TECHNIQUE



**High-voltage switchgear and controlgear –
Part 307: Guidance for the extension of validity of type tests of AC metal and
solid-insulation enclosed switchgear and controlgear for rated voltages above
1 kV and up to and including 52 kV**

**Appareillage à haute tension –
Partie 307: Lignes directrices pour l'extension de validité des essais de type
d'appareillages en courant alternatif sous enveloppe métallique et d'isolation
solide pour tensions assignées supérieures à 1 kV et jusqu'à 52 kV inclus**



THIS PUBLICATION IS COPYRIGHT PROTECTED

Copyright © 2015 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 Varembe
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 more than 30 000 terms and definitions in English and French, with equivalent terms in 15 additional languages. Also known as the International Electrotechnical Vocabulary (IEV) online.

IEC Glossary - std.iec.ch/glossary

More than 60 000 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 plus de 30 000 termes et définitions en anglais et en français, ainsi que les termes équivalents dans 15 langues additionnelles. Egalement appelé Vocabulaire Electrotechnique International (IEV) en ligne.

Glossaire IEC - std.iec.ch/glossary

Plus de 60 000 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 TR 62271-307

Edition 1.0 2015-09

TECHNICAL REPORT

RAPPORT TECHNIQUE



**High-voltage switchgear and controlgear –
Part 307: Guidance for the extension of validity of type tests of AC metal and
solid-insulation enclosed switchgear and controlgear for rated voltages above
1 kV and up to and including 52 kV**

**Appareillage à haute tension –
Partie 307: Lignes directrices pour l'extension de validité des essais de type
d'appareillages en courant alternatif sous enveloppe métallique et d'isolation
solide pour tensions assignées supérieures à 1 kV et jusqu'à 52 kV inclus**

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

COMMISSION
ELECTROTECHNIQUE
INTERNATIONALE

ICS 29.130.10

ISBN 978-2-8322-2903-3

**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.**

CONTENTS

FOREWORD	5
1 General	7
1.1 Scope	7
1.2 Normative references	7
2 Terms and definitions	7
3 Use of extension criteria	9
3.1 General.....	9
3.2 Parameters for extension criteria	10
3.3 Use of calculations.....	10
3.3.1 General	10
3.3.2 Temperature rise calculations	11
3.3.3 Electric field calculations	11
3.3.4 Mechanical stress calculations.....	11
3.3.5 Short-circuit current calculations.....	11
3.3.6 Internal arc pressure rise calculations.....	12
3.4 Information needed for extension of type test validity	12
4 Application of extension criteria	12
4.1 Dielectric tests	12
4.2 Temperature rise tests	13
4.3 Mechanical tests	15
4.4 Short-time and peak withstand current tests.....	15
4.5 Making and breaking tests	16
4.6 Internal arc fault tests	17
4.6.1 General	17
4.6.2 Extension criteria with respect to design	17
4.6.3 Extension criteria with respect to ratings and installation conditions	18
5 Extending the validity of type tests	19
5.1 General.....	19
5.2 Extension of validity of a test report to other functional units (situation a)	20
5.3 Validation of a family by selection of test objects (situation b).....	21
5.3.1 General	21
5.3.2 Mapping of the family	21
5.3.3 Specification of test objects	22
5.4 Validation of an assembly by existing test reports (situation c).....	22
5.5 Validation of a design modification (situation d)	23
Annex A (informative) Rationale for the extension criteria	24
A.1 General.....	24
A.2 Dielectric tests	24
A.2.1 General	24
A.2.2 Clearances (Items 1 and 2).....	24
A.2.3 Insulating supports and material (Items 3 and 4).....	24
A.2.4 Live parts (Items 5 and 6).....	25
A.2.5 Open contact gap and isolating distance (Items 7 and 8)	25
A.2.6 Minimum functional pressure for insulation (Item 9)	25
A.3 Temperature rise tests	25
A.3.1 General	25

A.3.2	Centre distance between phase conductors (Item 1).....	26
A.3.3	Phase to earth distance (Item 2).....	26
A.3.4	Enclosure and compartment volume (Item 3).....	26
A.3.5	Insulating gas (Item 4).....	27
A.3.6	Conductors (Items 5 and 6).....	27
A.3.7	Conductor joints and connections (Items 7, 8 and 9).....	27
A.3.8	Ventilation area of partitions and enclosure (Item 10).....	27
A.3.9	Power dissipation of components (Item 11).....	28
A.3.10	Insulating barriers (Item 12).....	28
A.3.11	Insulating coating of conductors and enclosures (Item 13 and 14).....	28
A.3.12	Insulating material in contact with conductors (Item 15).....	29
A.4	Mechanical tests.....	29
A.4.1	General.....	29
A.4.2	Shutter systems (Item 1).....	29
A.4.3	Contacts of removable parts (Item 2).....	30
A.4.4	Interlocking systems (Items 3 and 4).....	30
A.5	Short-time and peak withstand current tests.....	30
A.5.1	General.....	30
A.5.2	Centre distance between phase conductors (Item 1).....	31
A.5.3	Conductors (Items 2, 5 and 6).....	31
A.5.4	Insulating conductor supports (Items 3 and 4).....	31
A.5.5	Insulating material in contact with conductors (Item 7).....	32
A.5.6	Enclosure, partitions or bushings (Item 8).....	32
A.5.7	Contacts of removable part (Item 9).....	32
A.6	Making and breaking tests.....	32
A.6.1	General.....	32
A.6.2	Clearance between phases and to earth (Items 1 and 2).....	33
A.6.3	Enclosure and compartment volume (Item 3).....	33
A.6.4	Insulating gas (Item 4).....	33
A.6.5	Conductors (Items 5 and 6).....	33
A.6.6	Insulating supports (Items 7, 8 and 9).....	33
A.7	Internal arc fault tests.....	34
A.7.1	General.....	34
A.7.2	Clearance between phases and to earth (Items 1 and 2).....	34
A.7.3	Compartment volume (Item 3).....	34
A.7.4	Pressure of insulating gas (Item 4).....	35
A.7.5	Material in the region of arc initiation (Items 5, 6, 7 and 8).....	35
A.7.6	Pressure relief opening devices (Items 9, 10 and 11).....	35
A.7.7	Enclosure and compartments (Items 12, 13, 14 and 15).....	36
A.8	Rationale for extension criteria with respect to arc fault ratings and installation conditions.....	36
A.8.1	General.....	36
A.8.2	Rated arc fault current and duration (items 1 and 2).....	36
A.8.3	Rated voltage (item 3).....	36
A.8.4	Rated frequency (item 4).....	37
A.8.5	Arrangement of assembly (items 5, 6 and 7).....	37
A.8.6	Indoor or outdoor installation (item 8).....	37
A.8.7	Type of accessibility (item 9).....	37
A.8.8	Accessible sides (item 10).....	37

Annex B (informative) Examples for the extension of validity of type tests.....	38
B.1 General.....	38
B.2 Design modification of a cable terminal in air insulated switchgear (AIS).....	38
B.3 Design modification of an AIS bus riser functional unit by adding current transformers	39
B.4 Design modification of a key-lock in the door of a functional unit of AIS	41
B.5 Extension of a ring-main unit (GIS) to functional units with larger width.....	41
B.6 Extension of a family of gas insulated switchgear (GIS) by a functional unit.....	43
Bibliography.....	46
Figure 1 – Extension of validity of one test report; situation a)	20
Figure 2 – Validation of a family by selection of appropriate test objects; situation b).....	21
Figure 3 – Validation of actual assembly with existing test reports; situation c)	23
Figure B.1 – Cable terminals in the connection compartment of air insulated switchgear.....	38
Figure B.2 – Addition of block-type current transformers into the bus riser functional unit of air insulated switchgear.....	40
Figure B.3 – Special type of key-lock as replacement for a standard key-lock in the door of air insulated switchgear	41
Figure B.4 – Front view and top cross sectional view of a combination of functional units making up a ring-main unit	42
Figure B.5 – Cross-section of two different functional units of GIS	44
Table 1 – Examples of design parameters.....	10
Table 2 – Extension criteria for dielectric withstand performance	13
Table 3 – Extension criteria for temperature rise performance	14
Table 4 – Extension criteria for mechanical performance	15
Table 5 – Extension criteria for short-time and peak withstand current performance	16
Table 6 – Extension criteria for making and breaking capacity	17
Table 7 – Extension criteria for internal arc fault withstand performance	18
Table 8 – Extension criteria for internal arc fault classification with respect to installation conditions	19
Table B.1 – Affirmation of extension criteria with respect to dielectric withstand performance of a functional unit.....	39
Table B.2 – Affirmation of extension criteria with respect to short-time current withstand performance of a functional unit	40
Table B.3 – Affirmation of extension criteria with respect to temperature rise performance of a ring-main-unit	43
Table B.4 – Affirmation of extension criteria with respect to internal arc classification of a GIS circuit-breaker compartment.....	44

INTERNATIONAL ELECTROTECHNICAL COMMISSION

HIGH-VOLTAGE SWITCHGEAR AND CONTROLGEAR –

**Part 307: Guidance for the extension of validity of type tests of
AC metal and solid-insulation enclosed switchgear and controlgear
for rated voltages above 1 kV and up to and including 52 kV**

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.

The main task of IEC technical committees is to prepare International Standards. However, a technical committee may propose the publication of a technical report when it has collected data of a different kind from that which is normally published as an International Standard, for example "state of the art".

IEC TR 62271-307, which is a technical report, has been prepared by subcommittee 17C: Assemblies, of IEC technical committee 17: High-voltage switchgear and controlgear.

This Technical Report is to be read in conjunction with IEC 62271-200 published in 2011 and IEC 62271-201 published in 2014.

The text of this Technical Report is based on the following documents:

Enquiry draft	Report on voting
17C/625/DTR	17C/632/RVC

Full information on the voting for the approval of this Technical Report 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.

A list of all parts in the IEC 62271 series, published 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 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.

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.

HIGH-VOLTAGE SWITCHGEAR AND CONTROLGEAR –

Part 307: Guidance for the extension of validity of type tests of AC metal and solid-insulation enclosed switchgear and controlgear for rated voltages above 1 kV and up to and including 52 kV

1 General

1.1 Scope

This Part of IEC 62271, which is a Technical Report, refers to prefabricated metal-enclosed and solid-insulation enclosed (both hereinafter called enclosed) switchgear and controlgear assemblies for alternating current of rated voltages above 1 kV and up to and including 52 kV as specified in IEC 62271-200 and IEC 62271-201, and to other equipment included in the same enclosure with any possible mutual influence.

This Technical Report may be used for the extension of the validity of type tests performed on one test object with a defined set of ratings to another switchgear assembly of the same family with a different set of ratings or different arrangements of components. It supports the selection of representative test objects composed of functional units of a family of switchgear and controlgear aimed at the optimization of type tests in order to perform a consistent conformity assessment.

This Technical Report utilises a combination of sound technical and physical principles, manufacturer and user experience and calculations to establish guidance for the extension of validity of type tests, covering various design and rating aspects.

1.2 Normative references

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.

IEC 60050-441:1984, *International Electrotechnical Vocabulary. Switchgear, controlgear and fuses*
IEC 60050-441:1984/AMD1:2000

IEC 62271-1:2007, *High-voltage switchgear and controlgear – Part 1: Common specifications*
IEC 62271-1:2007/AMD1:2011

IEC 62271-200:2011, *High-voltage switchgear and controlgear – Part 200: AC metal-enclosed switchgear and controlgear for rated voltages above 1 kV and up to and including 52 kV*

IEC 62271-201:2014, *High-voltage switchgear and controlgear – Part 201: AC solid-insulation enclosed switchgear and controlgear for rated voltages above 1 kV and up to and including 52 kV*

koniec náhľadu – text ďalej pokračuje v platenej verzii STN