



SLOVENSKI STANDARD

SIST EN 62271-3:2015

01-junij-2015

Nadomešča:
SIST EN 62271-3:2007

Visokonapetostne stikalne in krmilne naprave - 3. del: Digitalni vmesniki, ki temeljijo na IEC 61850 (IEC 62271-3:2015)

High-voltage switchgear and controlgear -- Part 3: Digital interfaces based on IEC 61850

iTeh STANDARD PREVIEW

Appareillage à haute tension -- (Partie 3: Interfaces numériques basées sur la CEI 61850)

Ta slovenski standard je istoveten z: EN 62271-3:2015
SIST EN 62271-3:2015
http://standards.iteh.ai/catalog/standards/sist/62271-3-2015/4308-b82a-63a713371e70/sist-en-62271-3-2015

ICS:

29.130.10	Visokonapetostne stikalne in krmilne naprave	High voltage switchgear and controlgear
35.200	Vmesniška in povezovalna oprema	Interface and interconnection equipment

SIST EN 62271-3:2015

en

iTeh STANDARD PREVIEW
(standards.iteh.ai)

SIST EN 62271-3:2015

<https://standards.iteh.ai/catalog/standards/sist/69a456a6-2cf9-4308-b82a-63a713371e70/sist-en-62271-3-2015>

EUROPEAN STANDARD

EN 62271-3

NORME EUROPÉENNE

EUROPÄISCHE NORM

May 2015

ICS 29.130.10

Supersedes EN 62271-3:2006

English Version

High-voltage switchgear and controlgear - Part 3: Digital interfaces based on IEC 61850 (IEC 62271-3:2015)

Appareillage à haute tension - Partie 3: Interfaces numériques basées sur l'IEC 61850
(IEC 62271-3:2015)

Hochspannungs-Schaltgeräte und -Schaltanlagen - Teil 3: Digitale Schnittstellen nach IEC 61850
(IEC 62271-3:2015)

This European Standard was approved by CENELEC on 2015-04-14. 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, 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

Foreword

The text of document 17C/617/FDIS, future edition 2 of IEC 62271-3, prepared by SC 17C "High-voltage switchgear and controlgear assemblies" of IEC/TC 17 "Switchgear and controlgear" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 62271-3:2015.

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) 2016-01-14
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2018-04-14

This document supersedes EN 62271-3:2006.

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

Endorsement notice

The text of the International Standard IEC 62271-3:2015 was approved by CENELEC as a European Standard without any modification. (standards.iteh.ai)

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

IEC 60265 Series	NOTE	Harmonized as EN 60265 Series ¹⁾
IEC 60794 Series	NOTE	Harmonized as EN 60794 Series.
IEC 61754-20:2012	NOTE	Harmonized as EN 61754-20:2012 (not modified).
IEC 61850-6:2009	NOTE	Harmonized as EN 61850-6:2010 (not modified).
IEC 61850-7-1:2011	NOTE	Harmonized as EN 61850-7-1:2011 (not modified).
IEC 61850-7-410:2012	NOTE	Harmonized as EN 61850-7-410:2013 (not modified).
IEC 61850-7-420:2009	NOTE	Harmonized as EN 61850-7-420:2009 (not modified).
IEC 61869-9 ²⁾	NOTE	Harmonized as EN 61869-9 ²⁾ (not modified).
IEC 62271-102:2001	NOTE	Harmonized as EN 62271-102:2002 (not modified).
IEC 62271-102:2001/A1:2011	NOTE	Harmonized as EN 62271-102:2002/A1:2011 (not modified).
IEC 62271-102:2001/A2:2013	NOTE	Harmonized as EN 62271-102:2002/ A2:2013 (not modified).
IEC 62271-103	NOTE	Harmonized as EN 62271-103.
IEC 62271-104	NOTE	Harmonized as EN 62271-104.
IEC 62271-202	NOTE	Harmonized as EN 62271-202.
ISO/IEC 7498-1:1994	NOTE	Harmonized as EN ISO/IEC 7498-1:1994 ³⁾ (not modified).

¹⁾ Superseded by EN 62271 Series.

²⁾ At draft stage.

³⁾ Withdrawn publication.

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

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 60870-4	1990	Telecontrol equipment and systems - Part 4: Performance requirements	HD 546.4 S1	1992
IEC 61850-3	2013	Communication networks and systems for power utility automation - Part 3: General requirements	EN 61850-3	2014
IEC 61850-4	2011	Communication networks and systems for power utility automation - Part 4: System and project management	EN 61850-4	2011
IEC 61850-5	2013	Communication networks and systems for power utility automation - Part 5: Communication requirements for functions and device models	EN 61850-5	2013
IEC 61850-7-2	2010	Communication networks and systems for power utility automation - Part 7-2: Basic information and communication structure - Abstract communication service interface (ACSI)	EN 61850-7-2	2010
IEC 61850-7-3	2010	Communication networks and systems for power utility automation - Part 7-3: Basic communication structure - Common data classes	EN 61850-7-3	2011
IEC 61850-7-4	2010	Communication networks and systems for power utility automation - Part 7-4: Basic communication structure - Compatible logical node classes and data object classes	EN 61850-7-4	2010
IEC 61850-8-1	2011	Communication networks and systems for power utility automation - Part 8-1: Specific Communication Service Mapping (SCSM) - Mappings to MMS (ISO 9506-1 and ISO 9506-2) and to ISO/IEC 8802-3	EN 61850-8-1	2011

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 61850-9-2	2011	Communication networks and systems for power utility automation - Part 9-2: Specific Communication Service Mapping (SCSM) - Sampled values over ISO/IEC 8802-3	EN 61850-9-2	2011
IEC 61850-10	2012	Communication networks and systems for power utility automation - Part 10: Conformance testing	EN 61850-10	2013
IEC/TR 61850-90-4	2013	Communication networks and systems for power utility automation - Part 90-4: Network engineering guidelines	-	-
IEC 62271-1	2007	High-voltage switchgear and controlgear - Part 1: Common specifications	EN 62271-1	2008
A1	2011		A1	2011
IEC 62271-100	2008	High-voltage switchgear and controlgear - Part 100: Alternating current circuit-breakers	EN 62271-100	2009
A1 + corr. December 2012	2012		A1	2012

iTeh STANDARD PREVIEW (standards.iteh.ai)

[SIST EN 62271-3:2015](https://standards.iteh.ai/catalog/standards/sist/69a456a6-2cf9-4308-b82a-63a713371e70/sist-en-62271-3-2015)

<https://standards.iteh.ai/catalog/standards/sist/69a456a6-2cf9-4308-b82a-63a713371e70/sist-en-62271-3-2015>



IEC 62271-3

Edition 2.0 2015-03

INTERNATIONAL STANDARD

NORME INTERNATIONALE



High-voltage switchgear and controlgear –
Part 3: Digital interfaces based on IEC 61850

Appareillage à haute tension –
Partie 3: Interfaces numériques basées sur l'IEC 61850

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

COMMISSION
ELECTROTECHNIQUE
INTERNATIONALE

ICS 29.130.10

ISBN 978-2-8322-2341-3

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
INTRODUCTION.....	7
0.1 General.....	7
0.2 Position of this standard in relation to the IEC 61850 series.....	7
1 Scope.....	8
2 Normative references	8
3 Terms and definitions	9
4 Normal and special service conditions	13
5 Ratings and classifications	13
5.1 LNs on the process level of a high-voltage substation	13
5.2 Communication services	15
5.2.1 Conformance classes	15
5.2.2 ACSI basic conformance statement	15
5.2.3 ACSI models conformance statement	16
5.2.4 ACSI service conformance statement	18
5.3 Timing requirements	19
5.3.1 General.....	19
5.3.2 Opening and closing times for circuit-breakers.....	21
5.4 Data security.....	23
5.5 Data integrity	23
5.6 Performance requirements.....	23
5.6.1 Performance classes for reliability.....	23
5.6.2 Performance classes for availability.....	23
5.6.3 Performance classes for maintainability.....	23
5.6.4 Dependability.....	23
5.6.5 Maximum expansion of the network	24
6 Design and construction	24
6.1 General.....	24
6.1.1 Typical location of switchgear controllers and communication devices	24
6.1.2 Typical system topology	26
6.1.3 Typical controller system redundancy	30
6.2 Technological boundaries	30
6.2.1 General	30
6.2.2 Interface point	30
6.2.3 Transmission systems	30
6.2.4 Human machine interface	31
6.3 Mechanical requirements	31
6.3.1 Mechanical stresses	31
6.3.2 Degree of protection provided by enclosures	31
6.3.3 Degree of protection for connectors	31
6.3.4 Accessibility.....	31
6.4 Electrical requirements	31
6.5 EMC	31
6.6 Electronic nameplates.....	31
7 Type tests	32

7.1	General.....	32
7.2	Switchgear communication interface conformance tests.....	32
7.3	Time measurement of switchgear.....	32
7.3.1	Circuit-breakers.....	32
7.3.2	Other switchgear.....	35
8	Routine tests.....	35
8.1	General.....	35
8.2	Time measurement on switchgear.....	36
9	Information to be given with enquiries, tenders and orders.....	36
10	Rules for transport, storage, installation, operation and maintenance.....	36
11	Safety.....	36
Annex A (normative)	Test overview table.....	37
Annex B (normative)	Electronic nameplates.....	38
B.1	General.....	38
B.2	Electronic nameplate for circuit breaker.....	38
B.3	Electronic nameplate for switchgear other than circuit breakers.....	40
B.4	Presence conditions.....	41
Annex C (informative)	Test procedures – Performance type testing.....	44
Bibliography.....		46
iTeh STANDARD PREVIEW		
Figure 1	– Calculation of intelligent switchgear operating times (example 1).....	20
Figure 2	– Calculation of intelligent switchgear operating times (example 2).....	20
Figure 3	– Opening/closing command to intelligent switchgear.....	21
Figure 4	– Opening/closing command to switchgear.....	21
Figure 5	– Opening operation of an intelligent circuit-breaker.....	22
Figure 6	– Closing operation of an intelligent circuit-breaker.....	23
Figure 7	– GIS (example 1).....	24
Figure 8	– Secondary system in medium voltage cubicle (example 2).....	25
Figure 9	– AIS circuit-breaker (example 3).....	26
Figure 10	– AIS circuit-breaker (example 4).....	26
Figure 11	– GIS (example 1) with serial communication network.....	27
Figure 12	– GIS (example 2) with serial communication network.....	28
Figure 13	– AIS circuit-breaker (example 3) with serial communication network.....	29
Figure 14	– AIS circuit-breaker (example 4) with serial communication network.....	29
Figure 15	– Performance test of an intelligent switchgear (configuration 1).....	33
Figure 16	– Performance test of an intelligent switchgear (configuration 2).....	34
Figure C.1	– Performance test of an intelligent switchgear – CBC operating time.....	44
Figure C.2	– Performance test of an intelligent switchgear – CB operating time.....	45
Table 1	– LNs on process level.....	14
Table 2	– ACSI basic conformance statement.....	16
Table 3	– ACSI models conformance statement.....	17
Table 4	– Additional restrictions for GOOSE.....	18
Table 5	– ACSI service conformance statement.....	19

Table A.1 – Test overview table	37
Table B.1 – Common data class VSD	38
Table B.2 – New Data Objects added to LN XCBR.....	39
Table B.3 – New data objects added to LN XSWI.....	40
Table B.4 – Conditions for application of new data objects.....	41
Table B.5 – Explanations for attributes (1 of 2)	42

iTeh STANDARD PREVIEW
(standards.iteh.ai)

SIST EN 62271-3:2015

<https://standards.iteh.ai/catalog/standards/sist/69a456a6-2cf9-4308-b82a-63a713371e70/sist-en-62271-3-2015>

INTERNATIONAL ELECTROTECHNICAL COMMISSION

HIGH-VOLTAGE SWITCHGEAR AND CONTROLGEAR –

Part 3: Digital interfaces based on IEC 61850

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 62271-3 has been prepared by subcommittee 17C: High-voltage switchgear and controlgear assemblies, of IEC technical committee 17: Switchgear and controlgear.

This second edition cancels and replaces the first edition published in 2006. This edition constitutes a technical revision.

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

- a) an update to the latest edition(s) of IEC 61850 series;
(e.g. Annex B "LNs for sensors and monitoring" of edition 1 has been deleted since these LNs are now covered by standard IEC 61850-7-4:2010)
- b) an update of normative references;

- c) the minimum voltage range this standard refers to, was changed from 72,5 kV to above 1 kV;
- d) the description of performance tests and conformance tests became more specific;
- e) the new – informative – Annex C gives an example for performance type testing;
- f) 6.2.3 “transmission systems” as well as appropriate subclauses have been superseded by standard IEC TR 61850-90-4:2013;
- g) fibre optical connector type LC becomes only recommended type of fibre optic connector in accordance with IEC TR 61850-90-4:2013;
- h) electronic nameplates have been redefined as extension of LN XCBR and LN XSWI with data objects, reflecting required additional name plate information.

NOTE A new common data class Visible String Description (VSD) will be added to the IEC 61850-7-3 to support these new data objects.

This standard has the status of a product family standard and may be used as a normative reference in a dedicated product standard for highvoltage switchgear and controlgear.

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

FDIS	Report on voting
17C/617/FDIS	17C/623/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.

(standards.iteh.ai)

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

SIST EN 62271-3:2015

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.

INTRODUCTION

0.1 General

This standard is a product family standard for high-voltage switchgear and controlgear and assemblies thereof. It provides an application of the horizontal standard series IEC 61850 which details layered power utility communication architecture, in the world of high-voltage switchgear and controlgear.

By providing tutorial material such as examples and explanations, it also gives an access for switchgear experts to concepts and methods applied in the IEC 61850 series.

Compared to switchgear equipment, digital communication technology is subject to ongoing changes which are expected to continue in the future. Profound experience with electronics integrated directly into switchgear has yet to be gathered on a broader basis, as this type of equipment is not widely spread in the industry and a change of metabolism has not yet occurred.

This situation is taken into account in this standard by setting an appropriate validity date and by specifying several options to most of the communication-related requirements, such as connectors or fibres.

0.2 Position of this standard in relation to the IEC 61850 series

The IEC 61850 series is a horizontal standard intended to be used for communication and systems in the power utility. The most important parts of this series define:

- 1) information models for the power utility automation system.
These information models include both the models of the switchgear (like circuit-breakers and disconnectors) and other process equipment (like instrument transformers), and the models of the power utility automation system (like protection relays);
- 2) the communication between intelligent electronic devices (IEDs) of the power utility automation system;
- 3) a configuration language used to describe the configuration aspects of the power utility automation system;
- 4) conformance testing of the communication interfaces of the IEDs of the power utility automation system including their data models.

Typically, IEDs like bay level controllers interface to switchgear. In that case, the data models of the switchgear are implemented in these devices. However, this is not the only realization. In the case where electronics are integrated direct into switchgear, the above-mentioned data models should be implemented within the switchgear and the switchgear supports a communication interface.

IEC 61850, being a horizontal standard series, leaves many options open in order to support present and future requirements of all sizes of power utility automation system at all voltage levels.

HIGH-VOLTAGE SWITCHGEAR AND CONTROLGEAR –

Part 3: Digital interfaces based on IEC 61850

1 Scope

This part of IEC 62271 is applicable to high-voltage switchgear and controlgear for all rated voltage levels above 1 kV and assemblies thereof and specifies equipment for digital communication with other parts of the power utility automation and its impact on testing. This equipment for digital communication, replacing metal parallel wiring, can be integrated into the high-voltage switchgear, controlgear, and assemblies thereof, or can be external equipment in order to provide compliance for existing switchgear and controlgear and assemblies thereof with the standards of the IEC 61850 series.

This International Standard is a product standard based on the IEC 61850 series. It deals with all relevant aspects of switchgear and controlgear, and assemblies thereof with a serial communication interface according to the IEC 61850 series. In particular it defines:

- a) a selection of the information models from the IEC 61850 series that are supported by such switchgear and controlgear, and assemblies thereof;
- b) conformance classes for the set of communication services that are supported by the switchgear and controlgear, and assemblies thereof;
- c) modifications and extensions to type and routine tests of switchgear and controlgear, and assemblies thereof that are required due to the serial communication interface.

The standard specifies the requirements for digital communication equipment used within high-voltage switchgear, controlgear, and assemblies thereof, as well as the relevant testing requirements.

The relevant switchgear standards of the IEC 62271 series are applicable in general, with the additional specifications described in this standard.

NOTE 1 This standard intends to promote interoperability of communication interfaces. Interchangeability is outside the scope of this standard, as there is no requirement for it. Interchangeability is also outside the scope of the IEC 61850 series.

NOTE 2 For an introduction to power utility automation communication and the related terms, definitions and models, refer to IEC 61850-1 which provides an overview of the objectives and requirements of the IEC 61850 series in general. IEC 61850-7-1 provides an overview of modelling techniques.

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 60870-4:1990, *Telecontrol equipment and systems – Part 4: Performance requirements*

IEC 61850-3:2013, *Communication networks and systems for power utility automation – Part 3: General requirements*

IEC 61850-4:2011, *Communication networks and systems for power utility automation – Part 4: System and project management*

IEC 61850-5:2013, *Communication networks and systems for power utility automation – Part 5: Communication requirements for functions and device models*

IEC 61850-7-2:2010, *Communication networks and systems for power utility automation – Part 7-2: Basic information and communication structure – Abstract communication service interface (ACSI)*

IEC 61850-7-3:2010, *Communication networks and systems for power utility automation – Part 7-3: Basic communication structure – Common data classes*

IEC 61850-7-4:2010, *Communication networks and systems for power utility automation – Part 7-4: Basic communication structure – Compatible logical node classes and data object classes*

IEC 61850-8-1:2011, *Communication networks and systems for power utility automation – Part 8-1: Specific communication service mapping (SCSM) – Mappings to MMS (ISO 9506-1 and ISO 9506-2) and to ISO/IEC 8802-3*

IEC 61850-9-2:2011, *Communication networks and systems for power utility automation – Part 9-2: Specific communication service mapping (SCSM) – Sampled values over ISO/IEC 8802-3*

IEC 61850-10:2012, *Communication networks and systems for power utility automations – Part 10: Conformance testing*

IEC TR 61850-90-4:2013, *Communication networks and systems for power utility automation – Part 90-4: Network engineering guidelines*

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

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

IEC 62271-100:2008/AMD1:2012

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1

time requirement

maximum acceptable time delay between source and sink

3.2

mandatory data

data where coding is specified and the information always present

Note 1 to entry: Mandatory data ensures interoperability in power utility automation.

3.3

optional data

data where the coding is specified but the information not necessarily present

3.4

data integrity

ability of a communication system to deliver data from its originator to its destinations with an acceptable residual error rate