



SLOVENSKI STANDARD
SIST EN IEC 61869-1:2024

01-december-2024

Instrumentni transformatorji - 1. del: Splošne zahteve (IEC 61869-1:2023)

Instrument transformers - Part 1: General requirements (IEC 61869-1:2023)

Messwandler - Teil 1: Allgemeine Anforderungen (IEC 61869-1:2023)

Transformateurs de mesure - Partie 1: Exigences générales (IEC 61869-1:2023)

Ta slovenski standard je istoveten z: EN IEC 61869-1:2024

ICS:

17.220.20 Merjenje električnih in magnetnih veličin
Measurement of electrical and magnetic quantities

SIST EN IEC 61869-1:2024

en

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN IEC 61869-1

October 2024

ICS 17.220.20

Supersedes EN 61869-1:2009; EN 61869-6:2016

English Version

Instrument transformers - Part 1: General requirements (IEC 61869-1:2023)

Transformateurs de mesure - Partie 1: Exigences générales
(IEC 61869-1:2023)

Messwandler - Teil 1: Allgemeine Anforderungen
(IEC 61869-1:2023)

This European Standard was approved by CENELEC on 2024-09-11. 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, 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, Türkiye and the United Kingdom.

[SIST EN IEC 61869-1:2024](https://standards.iteh.ai/catalog/standards/sist/a488ace8-3afd-4c10-bcdf-41bad1a46ed8/sist-en-iec-61869-1-2024)

<https://standards.iteh.ai/catalog/standards/sist/a488ace8-3afd-4c10-bcdf-41bad1a46ed8/sist-en-iec-61869-1-2024>



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

EN IEC 61869-1:2024 (E)**European foreword**

The text of document 38/718/FDIS, future edition 2 of IEC 61869-1, prepared by TC 38 "Instrument Transformers" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN IEC 61869-1:2024.

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) 2025-10-31
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2027-10-31

This document supersedes EN 61869-1:2009 and EN 61869-6:2016 and all of its amendments and corrigenda (if any).

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.

Any feedback and questions on this document should be directed to the users' national committee. A complete listing of these bodies can be found on the CENELEC website.

iTeh Standards

(<https://standards.iteh.ai>)

Endorsement notice

Document Preview

The text of the International Standard IEC 61869-1:2023 was approved by CENELEC as a European Standard without any modification.

<https://standards.iteh.ai> SIST EN IEC 61869-1:2024

In the official version, for Bibliography, the following notes have to be added for the standard indicated: <https://standards.iteh.ai> SIST EN IEC 61869-1:2024

IEC 60255-1:2009 NOTE Approved as EN 60255-1:2010 (not modified)

IEC 60255-27:2013 NOTE Approved as EN 60255-27:2014 (not modified)

IEC 60664-1 NOTE Approved as EN IEC 60664-1

IEC 60695-1-30 NOTE Approved as EN 60695-1-30

IEC 60695-7-1 NOTE Approved as EN 60695-7-1

IEC 60721-2-6 NOTE Approved as EN IEC 60721-2-6

IEC 60812 NOTE Approved as EN IEC 60812

IEC 61000 (series) NOTE Approved as EN IEC 61000 (series)

IEC 61000-4-7 NOTE Approved as EN 61000-4-7

IEC 61000-6-5 NOTE Approved as EN 61000-6-5

IEC 61025 NOTE Approved as EN 61025

IEC 61754-2 NOTE Approved as EN 61754-2

IEC 61754-20 NOTE Approved as EN 61754-20

IEC 62262 NOTE Approved as EN 62262

IEC 62271-1:2017 NOTE Approved as EN 62271-1:2017 (not modified)

iTeh Standards
(<https://standards.iteh.ai>)
Document Preview

[SIST EN IEC 61869-1:2024](https://standards.iteh.ai/catalog/standards/sist/a488ace8-3afd-4c10-bedf-41bad1a46ed8/sist-en-iec-61869-1-2024)

<https://standards.iteh.ai/catalog/standards/sist/a488ace8-3afd-4c10-bedf-41bad1a46ed8/sist-en-iec-61869-1-2024>

EN IEC 61869-1:2024 (E)

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.cencenelec.eu.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 60060-1	-	High-voltage test techniques - Part 1: General definitions and test requirements	EN 60060-1	-
IEC 60068-2-1	-	Environmental testing - Part 2-1: Tests - Test A: Cold	EN 60068-2-1	-
IEC 60068-2-2	2007	Environmental testing - Part 2-2: Tests - Test B: Dry heat	EN 60068-2-2	2007
IEC 60068-2-6	-	Environmental testing - Part 2-6: Tests - Test Fc: Vibration (sinusoidal)	EN 60068-2-6	-
IEC 60068-2-11	-	Environmental testing - Part 2-11: Tests - Test Ka: Salt mist	EN IEC 60068-2-11	-
IEC 60068-2-17	-	Environmental testing - Part 2-17: Tests - Test Q: Sealing	EN IEC 60068-2-17	-
IEC 60068-2-27	2008	Environmental testing - Part 2-27: Tests - Test Ea and guidance: Shock	EN 60068-2-27	2009
IEC 60068-2-47	-	Environmental testing - Part 2-47: Test - Mounting of specimens for vibration, impact and similar dynamic tests	EN 60068-2-47	-
IEC 60068-2-57	2013	Environmental testing - Part 2-57: Tests - Test Ff: Vibration - Time-history and sine-beat method	EN 60068-2-57	2013
IEC 60068-2-75	-	Environmental testing - Part 2-75: Tests - Test Eh: Hammer tests	EN 60068-2-75	-
IEC 60068-2-78	2012	Environmental testing - Part 2-78: Tests - Test Cab: Damp heat, steady state	EN 60068-2-78	2013
IEC 60068-3-3	2019	Environmental testing - Part 3-3: Supporting documentation and guidance - Seismic test methods for equipment	EN IEC 60068-3-3	2019
IEC 60071-1	2019	Insulation co-ordination - Part 1: Definitions, principles and rules	EN IEC 60071-1	2019
IEC 60071-2	2018	Insulation co-ordination - Part 2: Application guidelines	EN IEC 60071-2	2018

EN IEC 61869-1:2024 (E)

IEC 60085	-	Electrical insulation - Thermal evaluation and designation	EN 60085	-
IEC 60270	2000	High-voltage test techniques - Partial discharge measurements	EN 60270	2001
+ A1	2015		+ A1	2016
IEC 60296	-	Fluids for electrotechnical applications - Mineral insulating oils for electrical equipment	EN IEC 60296	-
IEC 60376	-	Specification of technical grade sulphur hexafluoride (SF ₆) and complementary gases to be used in its mixtures for use in electrical equipment	EN IEC 60376	-
IEC 60455	series	Resin based reactive compounds used for electrical insulation	EN IEC 60455	series
IEC 60475	-	Method of sampling insulating liquids	EN IEC 60475	-
IEC 60480	-	Specification for the re-use of sulphur hexafluoride (SF ₆) and its mixtures in electrical equipment	EN IEC 60480	
IEC 60529	1989	Degrees of protection provided by enclosures (IP Code)	EN 60529	1991
-	-		+ corrigendum May	1993
+ A1	1999		+ A1	2000
+ A2	2013		+ A2	2013
IEC 60603-7-1	-	Connectors for electronic equipment - Part 7-1: Detail specification for 8-way, shielded, free and fixed connectors	EN 60603-7-1	-
IEC 60695-1-10	-	Fire hazard testing - Part 1-10: Guidance for assessing the fire hazard of electrotechnical products - General guidelines	EN 60695-1-10	-
IEC 60695-1-11	-	Fire hazard testing - Part 1-11: Guidance for assessing the fire hazard of electrotechnical products - Fire hazard assessment	EN 60695-1-11	-
IEC 60794-2	2017	Optical fibre cables - Part 2: Indoor cables - Sectional specification	EN 60794-2	2017
IEC 60794-3	-	Optical fibre cables - Part 3: Outdoor cables - Sectional specification	EN IEC 60794-3	-
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		-

EN IEC 61869-1:2024 (E)

IEC 60867	-	Insulating liquids - Specifications for unused liquids based on synthetic aromatic hydrocarbons	EN IEC 60867	-
IEC/TR 61000-4-1	-	Electromagnetic compatibility (EMC) - Part 4-1: Testing and measurement techniques - Overview of IEC 61000-4 series		
IEC 61000-4-2	-	Electromagnetic compatibility (EMC) - Part 4-2: Testing and measurement techniques - Electrostatic discharge immunity test	EN 61000-4-2	-
IEC 61000-4-3	-	Electromagnetic compatibility (EMC) - Part 4-3: Testing and measurement techniques - Radiated, radio-frequency, electromagnetic field immunity test	EN IEC 61000-4-3	-
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 61000-4-5	2014	Electromagnetic compatibility (EMC) - Part 4-5: Testing and measurement techniques - Surge immunity test	EN 61000-4-5	2014
+ A1			+ A1	2017
IEC 61000-4-6	-	Electromagnetic compatibility (EMC) - Part 4-6: Testing and measurement techniques - Immunity to conducted disturbances, induced by radio-frequency fields	EN 61000-4-6	-
IEC 61000-4-8	-	Electromagnetic compatibility (EMC) - Part 4-8: Testing and measurement techniques - Power frequency magnetic field immunity test	EN 61000-4-8	-
IEC 61000-4-9	-	Electromagnetic compatibility (EMC) - Part 4-9: Testing and measurement techniques - Impulse magnetic field immunity test	EN 61000-4-9	-
IEC 61000-4-10	-	Electromagnetic compatibility (EMC) - Part 4-10: Testing and measurement techniques - Damped oscillatory magnetic field immunity test	EN 61000-4-10	-
IEC 61000-4-11	-	Electromagnetic compatibility (EMC) - Part 4-11: Testing and measurement techniques - Voltage dips, short interruptions and voltage variations immunity tests for equipment with input current up to 16 A per phase	EN IEC 61000-4-11	-
IEC 61000-4-13	-	Electromagnetic compatibility (EMC) - Part 4-13: Testing and measurement techniques - Harmonics and interharmonics including mains signalling at a.c. power port, low frequency immunity tests	EN 61000-4-13	-
IEC 61000-4-16	-	Electromagnetic compatibility (EMC) - Part 4-16: Testing and measurement techniques - Test for immunity to conducted, common mode disturbances in the frequency range 0 Hz to 150 kHz	EN 61000-4-16	-

EN IEC 61869-1:2024 (E)

IEC 61000-4-17	-	Electromagnetic compatibility (EMC) - Part 4-17: Testing and measurement techniques - Ripple on d.c. input power port immunity test	EN 61000-4-17	-
IEC 61000-4-18	2019	Electromagnetic compatibility (EMC) - Part 4-18: Testing and measurement techniques - Damped oscillatory wave immunity test	EN IEC 61000-4-18	2019
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 61000-6-4	2018	Electromagnetic compatibility (EMC) - Part 6-4: Generic standards - Emission standard for industrial environments	EN IEC 61000-6-4	2019
IEC 61076-2-101	-	Connectors for electronic equipment - Product requirements - Part 2-101: Circular connectors - Detail specification for M12 connectors with screw-locking	EN 61076-2-101	-
IEC 61083-1	-	Instruments and software used for measurements in high-voltage and high-current tests - Part 1: Requirements for instruments for impulse tests	EN 61083-1	-
IEC 61099	-	Insulating liquids - Specifications for unused synthetic organic esters for electrical purposes	EN 61099	-
IEC 61181	-	Mineral oil-filled electrical equipment - Application of dissolved gas analysis (DGA) to factory tests on electrical equipment	EN 61181	-
IEC 61462	-	Composite hollow insulators - Pressurized and unpressurized insulators for use in electrical equipment with AC rated voltage greater than 1 000 V AC and D.C. voltage greater than 1500V - Definitions, test methods, acceptance criteria and design recommendations	EN IEC 61462	-
IEC 61850-7-4	-	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	-
IEC 61869-9	2016	Instrument transformers - Part 9: Digital interface for instrument transformers	EN IEC 61869-9	2019
IEC 61869-99	-	Instrument transformers - Part 99: Glossary	EN IEC 61869-99	-
IEC 62155	-	Hollow pressurized and unpressurized ceramic and glass insulators for use in electrical equipment with rated voltages greater than 1 000 V	EN 62155	-

EN IEC 61869-1:2024 (E)

IEC 62217	2012	Polymeric HV insulators for indoor and outdoor use - General definitions, test methods and acceptance criteria	EN 62217	2013
IEC 62271-4	2022	High-voltage switchgear and controlgear - Part 4: Handling procedures for gases for insulation and/or switching	EN IEC 62271-4	2022
IEC 62271-100	-	High-voltage switchgear and controlgear - Part 100: Alternating-current circuit-breakers	EN IEC 62271-100	-
IEC 62271-203	2022	High-voltage switchgear and controlgear - Part 203: AC gas-insulated metal-enclosed switchgear for rated voltages above 52 kV	EN IEC 62271-203	2022
IEC 62770	-	Fluids for electrotechnical application – Unused natural esters for transformers and similar electrical equipment	EN IEC 62772	-
IEC 63012	-	Insulating liquids - Unused modified or blended esters for electrotechnical applications	EN IEC 63012	-
ISO 4628-3	-	Paints and varnishes - Evaluation of degradation of coatings - Designation of quantity and size of defects, and of intensity of uniform changes in appearance - Part 3: Assessment of degree of rusting	EN ISO 4628-3	-
ISO 22479	-	Corrosion of metals and alloys - Sulfur dioxide test in a humid atmosphere (fixed gas method)	EN ISO 22479	-
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	-	-
ISO/IEC/IEEE 21451-4	-	Information technology - Smart transducer interface for sensors and actuators - Part 4: Mixed-mode communication protocols and Transducer Electronic Data Sheet (TEDS) formats	-	-



IEC 61869-1

Edition 2.0 2023-06

INTERNATIONAL STANDARD

NORME INTERNATIONALE



**Instrument transformers –
Part 1: General requirements**

**Transformateurs de mesure –
Partie 1: Exigences générales**

[SIST EN IEC 61869-1:2024](https://standards.iteh.ai/catalog/standards/sist/a488ace8-3afd-4c10-bedf-41bad1a46ed8/sist-en-iec-61869-1-2024)

<https://standards.iteh.ai/catalog/standards/sist/a488ace8-3afd-4c10-bedf-41bad1a46ed8/sist-en-iec-61869-1-2024>

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

COMMISSION
ELECTROTECHNIQUE
INTERNATIONALE

ICS 17.220.20

ISBN 978-2-8322-6940-4

**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.**

CONTENTS

FOREWORD.....	9
INTRODUCTION.....	12
1 Scope.....	14
2 Normative references	15
3 Terms, definitions, symbols and abbreviated terms.....	18
3.1 Terms and definitions.....	18
3.2 Symbols and abbreviated terms	18
4 Normal and special environmental conditions	19
4.1 General.....	19
4.2 Normal environmental conditions	20
4.2.1 Ambient air temperature	20
4.2.2 Altitude	20
4.2.3 Vibrations or earth tremors	20
4.2.4 Exposure to pollution	20
4.2.5 Other environmental conditions for indoor instrument transformers.....	20
4.2.6 Other environmental conditions for outdoor instrument transformers.....	21
4.2.7 IT with outdoor parts.....	21
4.3 Special environmental conditions.....	21
4.3.1 General	21
4.3.2 Altitude	21
4.3.3 Ambient temperature	21
4.3.4 Vibrations or earth tremors	22
4.3.5 Earthquakes	22
5 Ratings.....	22
5.1 General.....	22
5.2 Voltage ratings.....	22
5.2.1 Highest voltage for equipment (U_m).....	22
5.2.2 Power system earthing	25
5.2.3 Standard values for rated primary voltage (U_{pr}).....	25
5.2.4 Standard values for rated secondary voltage (U_{sr})	25
5.2.5 Rated auxiliary power supply voltage (U_{ar}).....	25
5.3 Current ratings.....	26
5.3.1 Standard values for rated primary current (I_{pr})	26
5.3.2 Standard values for rated secondary current (I_{sr})	26
5.3.3 Standard values for rated continuous thermal current (I_{cth}).....	26
5.3.4 Short-time current ratings	26
5.4 Dielectric ratings.....	27
5.4.1 General	27
5.4.2 Rated primary terminal insulation level	27
5.4.3 Other requirements for primary terminal insulation.....	27
5.4.4 Between-section insulation requirements.....	29
5.4.5 Insulation requirements for secondary terminals and low-voltage components.....	29
5.5 Rated frequency (f_r).....	30
5.6 Output ratings	30

5.6.1	Rated output for inductive instrument transformers and CVTs.....	30
5.6.2	Rated burden for LPITs	30
5.6.3	Standard values for the rated delay time for EITs (t_{dr}).....	30
5.7	Accuracy requirements	30
5.7.1	General	30
5.7.2	Rated accuracy classes	31
5.7.3	Accuracy class extension for harmonics	31
5.7.4	Accuracy requirements for harmonics	31
5.7.5	Harmonic requirements for LPIT protection accuracy classes	34
5.7.6	Anti-aliasing filter for EIT using digital data processing	34
6	Design and construction	36
6.1	Requirements for liquids used in equipment.....	36
6.1.1	General	36
6.1.2	Liquid quality	36
6.1.3	Liquid level indicator	37
6.1.4	Liquid tightness	37
6.2	Requirements for gases used in equipment.....	37
6.2.1	General	37
6.2.2	Gas quality	37
6.2.3	Gas monitoring device	37
6.2.4	Gas tightness	37
6.2.5	Pressure-relief device	38
6.3	Requirements for solid materials used in equipment	38
6.4	Requirements for temperature rise of parts and components.....	38
6.4.1	General	38
6.4.2	Influence of altitude on temperature rise	40
6.5	Requirements for earthing of equipment.....	41
6.5.1	General	41
6.5.2	Earthing of the enclosure	41
6.5.3	Electrical continuity.....	41
6.6	Requirements for the external insulation	41
6.6.1	Pollution	41
6.6.2	Altitude	42
6.7	Mechanical requirements	43
6.8	Multiple chopped impulses on primary terminals	44
6.9	Internal arc fault protection requirements	45
6.10	Degrees of protection by enclosures	45
6.10.1	General	45
6.10.2	Protection against access to hazardous parts and protection of the equipment against ingress of solid foreign objects and water	45
6.10.3	Protection of enclosure against mechanical impact under normal operating conditions	46
6.11	Electromagnetic compatibility (EMC).....	46
6.11.1	General	46
6.11.2	Requirements for immunity	46
6.11.3	Requirements for emission	50
6.11.4	Requirements for transmitted overvoltage (TOV)	50
6.11.5	Requirements for radio interference voltage (RIV)	50
6.12	Corrosion	50

6.13	Markings	50
6.13.1	General	50
6.13.2	Terminal markings	51
6.13.3	Rating plate markings	51
6.14	Requirements for LPIT secondary terminal connection	52
6.14.1	Requirements for digital output connection	52
6.14.2	Requirements for analogue output connections	53
6.15	EIT secondary signal noise	54
6.16	Fire hazard	55
6.17	Pressure withstand of gas-filled enclosures	55
6.18	Failure detection of EIT	55
6.19	Operability	55
6.20	Reliability and dependability of electronic part of EIT	55
6.21	Vibration requirements	56
6.22	Storage climatic conditions withstand capability	56
7	Tests	56
7.1	General	56
7.1.1	Classification of tests	56
7.1.2	List of tests	57
7.1.3	Sequence of tests	58
7.1.4	Testing conditions	60
7.2	Type tests	60
7.2.1	General	60
7.2.2	Temperature rise test	61
7.2.3	Impulse voltage withstand test on primary terminals	62
7.2.4	Wet test for outdoor type instrument transformers	65
7.2.5	Electromagnetic compatibility (EMC) tests	66
7.2.6	Tests for accuracy	71
7.2.7	Verification of the degree of protection by enclosures	74
7.2.8	Enclosure tightness test at ambient temperature	74
7.2.9	Proof test for the gas-filled enclosure	74
7.2.10	Mechanical tests	75
7.2.11	Voltage withstand test of low-voltage components and secondary terminals	76
7.2.12	Storage climatic environmental tests	77
7.2.13	Vibration test	79
7.2.14	Durability of markings	80
7.2.15	Tests for accuracy for harmonics	80
7.2.16	Test for anti-aliasing	81
7.3	Routine tests	81
7.3.1	Power-frequency voltage withstand test on primary terminals	81
7.3.2	Partial discharge measurement	82
7.3.3	Power-frequency voltage withstand tests between sections	84
7.3.4	Power-frequency voltage withstand tests on secondary terminals	85
7.3.5	Power-frequency voltage withstand test for low-voltage components	85
7.3.6	Test for accuracy	85
7.3.7	Verification of markings	86
7.3.8	Enclosure tightness test at ambient temperature	86
7.3.9	Pressure test for the gas-filled enclosure	86