



NSAI
Standards

Irish Standard
I.S. EN 61869-5:2011

Instrument transformers -- Part 5: Additional requirements for capacitor voltage transformers (IEC 61869-5:2011 (EQV))

I.S. EN 61869-5:2011

Incorporating amendments/corrigenda 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.

<i>This document replaces:</i> EN 60044-5:2004	<i>This document is based on:</i> EN 61869-5:2011 EN 60044-5:2004	<i>Published:</i> 21 October, 2011 21 June, 2004
This document was published under the authority of the NSAI and comes into effect on: 3 November, 2011		ICS number: 17.220.20
NSAI 1 Swift Square, Northwood, Santry Dublin 9	T +353 1 807 3800 F +353 1 807 3838 E standards@nsai.ie W NSAI.ie	Sales: T +353 1 857 6730 F +353 1 857 6729 W standards.ie
Údarás um Chaighdeáin Náisiúnta na hÉireann		

English version

**Instrument transformers -
Part 5: Additional requirements for capacitor voltage transformers
(IEC 61869-5:2011)**

Transformateurs de mesure -
Partie 5: Exigences supplémentaires
concernant les transformateurs
condensateurs de tension
(CEI 61869-5:2011)

Messwandler -
Teil 5: Zusätzliche Anforderungen für
kapazitive Spannungswandler
(IEC 61869-5:2011)

This European Standard was approved by CENELEC on 2011-08-17. 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, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

CENELEC

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

Management Centre: Avenue Marnix 17, B - 1000 Brussels

Foreword

The text of document 38/411/FDIS, future edition 1 of IEC 61869-5, prepared by IEC/TC 38, "Instrument transformers", was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 61869-5:2011.

The following dates are fixed:

- latest date by which the EN has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2012-05-17
- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 2014-08-17

This European Standard supersedes EN 60044-5:2004 regarding capacitor voltage transformers.

EN 61869-5:2011 shall be read in conjunction with, and is based on, EN 61869-1:2009, Instrument transformers - General Requirements.

This Part 5 follows the structure of EN 61869-1 and supplements or modifies its corresponding clauses.

When a particular clause/subclause of Part 1 is not mentioned in this Part 5, that clause/subclause applies as far as is reasonable. When this standard states "addition", "modification" or "replacement", the relevant text in Part 1 shall be adapted accordingly.

For additional clauses, subclauses, figures, tables, annexes or notes, the following numbering system is used:

- clauses, subclauses, tables, figures and notes that are numbered starting from 501 are additional to those in Part 1;
- additional annexes are lettered 5A, 5B, etc.

Annex ZZ of EN 61869-1 is not applicable for this part of the series.

An overview of the planned set of standards at the date of publication of this document is given below. The updated list of standards prepared by IEC TC38 is available at the website: www.iec.ch.

The updated list of standards prepared by IEC TC38 and approved by CENELEC is available at the website: www.cenelec.eu.

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

PRODUCT FAMILY STANDARDS	PRODUCT STANDARD	PRODUCTS	OLD STANDARD	
61869-1 GENERAL REQUIREMENTS FOR INSTRUMENT TRANSFORMERS	61869-2	ADDITIONAL REQUIREMENTS FOR CURRENT TRANSFORMERS	60044-1	
	61869-3	ADDITIONAL REQUIREMENTS FOR INDUCTIVE VOLTAGE TRANSFORMERS	60044-2	
	61869-4	ADDITIONAL REQUIREMENTS FOR COMBINED TRANSFORMERS	60044-3	
	61869-5	ADDITIONAL REQUIREMENTS FOR CAPACITIVE VOLTAGE TRANSFORMERS	60044-5	
	61869-6 ADDITIONAL GENERAL REQUIREMENT FOR ELECTRONIC INSTRUMENT TRANSFORMERS AND LOW POWER STAND ALONE SENSORS	61869-7	ADDITIONAL REQUIREMENTS FOR ELECTRONIC VOLTAGE TRANSFORMERS	60044-7
		61869-8	ADDITIONAL REQUIREMENTS FOR ELECTRONIC CURRENT TRANSFORMERS	60044-8
		61869-9	DIGITAL INTERFACE FOR INSTRUMENT TRANSFORMERS	
		61869-10	ADDITIONAL REQUIREMENTS FOR LOW-POWER STAND-ALONE CURRENT SENSORS	
		61869-11	ADDITIONAL REQUIREMENTS FOR LOW POWER STAND ALONE VOLTAGE SENSOR	60044-7
		61869-12	ADDITIONAL REQUIREMENTS FOR COMBINED ELECTRONIC INSTRUMENT TRANSFORMER OR COMBINED STAND ALONE SENSORS	
		61869-13	STAND ALONE MERGING UNIT	

Endorsement notice

The text of the International Standard IEC 61869-5:2011 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following note has to be added for the standard indicated:

IEC 60422

NOTE Harmonized as EN 60422.

Annex ZA (normative)

Normative references to international publications with their corresponding European publications

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

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

Annex ZA of EN 61869-1:2009 applies with the following additions:

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 60038 (mod)	2009	IEC standard voltages	EN 60038	2011
IEC 60050-436	-	International Electrotechnical Vocabulary (IEV) - Chapter 436: Power capacitors	-	-
IEC 60050-601	-	International Electrotechnical Vocabulary (IEV) - Chapter 601: Generation, transmission and distribution of electricity - General	-	-
IEC 60050-604	-	International Electrotechnical Vocabulary (IEV) - Chapter 604: Generation, transmission and distribution of electricity - Operation	-	-
IEC 60060-1	-	High-voltage test techniques - Part 1: General definitions and test requirements	EN 60060-1	-
IEC 60358	-	Coupling capacitors and capacitor dividers	HD 597 S1	-
IEC 60481	-	Coupling devices for power line carrier systems	-	-
IEC 61869-1 (mod)	2007	Instrument transformers - Part 1: General requirements	EN 61869-1	2009

CONTENTS

FOREWORD.....	5
1 Scope.....	8
2 Normative references	8
3 Terms and Definitions.....	8
3.1 General definitions	9
3.2 Definitions related to dielectric ratings and voltages.....	14
3.4 Definitions related to accuracy.....	14
3.5 Definitions related to other ratings	14
3.7 Index of abbreviations.....	15
5 Ratings.....	15
5.3 Rated insulation levels	16
5.3.3 Other requirements for primary terminals insulation	16
5.3.5 Insulation requirements for secondary terminals.....	17
5.3.501 Electromagnetic unit insulation requirements.....	17
5.4 Rated frequency.....	17
5.5 Rated output.....	17
5.5.501 Rated output values.....	17
5.5.502 Rated thermal limiting output.....	18
5.5.503 Rated output values for residual voltage windings	18
5.5.504 Rated thermal limiting output for residual voltage windings	18
5.6 Rated accuracy class.....	18
5.6.501 Accuracy requirements for measuring capacitor voltage transformer.....	18
5.6.502 Accuracy requirements for protective capacitor voltage transformers	19
5.501 Standard values of rated voltages	20
5.501.1 Rated primary voltages U_{Pr}	20
5.501.2 Rated secondary voltages	20
5.501.3 Rated voltages for secondary winding intended to produce a residual voltage	21
5.501.4 Standard values of rated voltage factor.....	21
6 Design and construction	22
6.1 Requirements for liquids used in equipment.....	22
6.1.4 Liquid tightness.....	22
6.7 Mechanical requirements.....	22
6.8 Multiple chopped impulse on primary terminals.....	22
6.9 Internal arc fault protection requirements	22
6.13 Markings.....	22
6.13.501 Terminal markings	22
6.13.502 Rating plate markings.....	23
6.501 Short circuit withstand capability.....	27
6.502 Ferro-resonance.....	27
6.502.1 General	27
6.502.2 Transients of ferro-resonance oscillations.....	27
6.503 Transient response	28
6.503.1 General	28
6.503.2 Requirements for transient response	28
6.503.3 Standard transient response classes	28

6.504	Requirements for carrier – frequency accessories	29
6.504.1	General	29
6.504.2	Drain coil.....	29
6.504.3	Voltage limitation device	29
7	Tests	30
7.1	General	30
7.1.2	List of tests.....	30
7.1.3	Sequence of tests	31
7.2	Type tests.....	33
7.2.2	Temperature-rise test	33
7.2.3	Impulse voltage withstand test on primary terminals.....	34
7.2.4	Wet test for outdoor type transformers.....	35
7.2.6	Test for accuracy	35
7.2.8	Enclosure tightness test at ambient temperature	37
7.2.501	Capacitance and $\tan\delta$ measurement at power-frequency.....	37
7.2.502	Short-circuit withstand capability test	38
7.2.503	Ferro-resonance tests	39
7.2.504	Transient response test	39
7.2.505	Type test for carrier frequency accessories	41
7.3	Routine tests	42
7.3.1	Power-frequency voltage withstand tests on primary terminals	42
7.3.2	Partial discharge measurement.....	44
7.3.5	Test for accuracy	44
7.3.7	Enclosure tightness test at ambient temperature	46
7.3.8	Pressure test for the enclosure.....	46
7.3.501	Ferro-resonance check.....	46
7.3.502	Routine tests for carrier frequency accessories	46
7.4	Special tests.....	47
7.4.1	Chopped impulse voltage withstand test on primary terminals	47
7.4.2	Multiple chopped impulse test on primary terminals	47
7.4.3	Measurement of capacitance and dielectric dissipation factor.....	47
7.4.6	Internal arc fault test	47
7.4.501	Determination of the temperature coefficient (TC)	47
7.4.502	Tightness design test of capacitor units	47
Annex 5A (normative)	Typical diagrammeme of a capacitor voltage transformer	49
Annex 5B (informative)	Transient response of capacitor voltage transformer under fault conditions	50
Annex 5C (normative)	High-frequency characteristics of capacitor voltage transformers	51
Bibliography	52
Figure 501	– Error diagram of a capacitor voltage transformer for accuracy classes 0,2, 0,5 and 1,0	19
Figure 502	– Capacitor voltage transformer with a single secondary	23
Figure 503	– Capacitor voltage transformer with two secondaries	23
Figure 504	– Capacitor voltage transformer with two tapped secondaries	23
Figure 505	– Capacitor voltage transformer with one residual voltage winding and a single secondary.....	23

Figure 506 – Example of a typical rating plate.....	26
Figure 507 – Transient response of a capacitor voltage transformer	28
Figure 508 – Flow charts test sequence to be applied when performing type test (Figure 508a) and routine test (Figure 508b).....	32
Figure 509 – Diagram of a capacitor voltage transformer for the transient response test using equivalent circuit method.....	40
Figure 510 – Series burden.....	41
Figure 511 – Pure resistance	41
Figure 512 – Example of an error diagramme of class 1 CVT for accuracy check with the equivalent circuit.....	45
Figure 5A.1 – Example of a diagram for a capacitor voltage transformer.....	49
Figure 5A.2 – Example of a diagram for a capacitor voltage transformer with carrier- frequency accessories	49
Table 501 – Limits of voltage error and phase displacement for measuring capacitor voltage transformers	19
Table 502 – Limits of voltage error and phase displacement for protective capacitor voltage transformers	20
Table 503 – Rated secondary voltages for capacitor voltage transformers to produce a residual voltage	21
Table 504 – Standard values of rated voltage factors for accuracy and thermal requirements.....	21
Table 505 – Marking of the rating plate	23
Table 506a – Ferro-resonance requirements.....	27
Table 506b – Ferro-resonance requirements.....	28
Table 507 – Standard transient response values and classes	29
Table 10 – List of tests	31
Table 508 – Test voltage for temperature rise test	34
Table 509– Burden ranges for accuracy tests	36
Table 510 – Test voltages for units, stacks and complete capacitor voltage divider.....	43
Table 511 – Accuracy check points (example)	45
Table 512 – Ferro resonance check	46

INTERNATIONAL ELECTROTECHNICAL COMMISSION

INSTRUMENT TRANSFORMERS –

Part 5: Additional requirements for capacitor voltage transformers

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.

This International Standard IEC 61869-5 specific clauses for capacitor voltage transformers has been prepared by IEC technical committee 38: Instrument transformers.

This standard replaces IEC 60044-5 regarding capacitor voltage transformers as well as IEC-PAS 60044-5 for capacitor voltage transformers.

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

FDIS	Report on voting
38/411/FDIS	38/414/RVD

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

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

This standard is Part 5 of IEC 61869, published under the general title *Instrument transformers*.

This part 5 is to be read in conjunction with, and is based on, IEC 61869-1, *General Requirements* – first edition (2007) – however the reader is encouraged to use its most recent edition.

This Part 5 follows the structure of IEC 61869-1 and supplements or modifies its corresponding clauses.

When a particular clause/subclause of Part 1 is not mentioned in this Part 5, that clause/subclause applies as far as is reasonable. When this standard states “addition”, “modification” or “replacement”, the relevant text in Part 1 is to be adapted accordingly.

For additional clauses, subclauses, figures, tables, annexes or note, the following numbering system is used:

- clauses, subclauses, tables and figures and notes that are numbered starting from 501 are additional to those in Part 1;
- additional annexes are lettered 5A, 5B, etc.

An overview of the planned set of standards at the date of publication of this document is given below. The updated list of standards issued by IEC TC38 is available at the website: www.iec.ch.

I.S. EN 61869-5:2011

61869-5 © IEC:2011

- 7 -

PRODUCT FAMILY STANDARDS		PRODUCT STANDARD	PRODUCTS	OLD STANDARD
61869-1 GENERAL REQUIREMENTS FOR INSTRUMENT TRANSFORMERS		61869-2	ADDITIONAL REQUIREMENTS FOR CURRENT TRANSFORMERS	60044-1 60044-6
		61869-3	ADDITIONAL REQUIREMENTS FOR INDUCTIVE VOLTAGE TRANSFORMERS	60044-2
		61869-4	ADDITIONAL REQUIREMENTS FOR COMBINED TRANSFORMERS	60044-3
		61869-5	ADDITIONAL REQUIREMENTS FOR CAPACITIVE VOLTAGE TRANSFORMERS	60044-5
	61869-6 ADDITIONAL GENERAL REQUIREMENT FOR ELECTRONIC INSTRUMENT TRANSFORMERS AND LOW POWER STAND ALONE SENSORS	61869-7	ADDITIONAL REQUIREMENTS FOR ELECTRONIC VOLTAGE TRANSFORMERS	60044-7
		61869-8	ADDITIONAL REQUIREMENTS FOR ELECTRONIC CURRENT TRANSFORMERS	60044-8
		61869-9	DIGITAL INTERFACE FOR INSTRUMENT TRANSFORMERS	
		61869-10	ADDITIONAL REQUIREMENTS FOR LOW-POWER STAND-ALONE CURRENT SENSORS	
		61869-11	ADDITIONAL REQUIREMENTS FOR LOW POWER STAND ALONE VOLTAGE SENSOR	60044-7
		61869-12	ADDITIONAL REQUIREMENTS FOR COMBINED ELECTRONIC INSTRUMENT TRANSFORMER OR COMBINED STAND ALONE SENSORS	
		61869-13	STAND ALONE MERGING UNIT	

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.

INSTRUMENT TRANSFORMERS –

Part 5: Additional requirements for capacitor voltage transformers

1 Scope

This part of IEC 61869 applies to new single-phase capacitor voltage transformers connected between line and ground for system voltages $U_m \geq 72,5$ kV at power frequencies from 15 Hz to 100 Hz. They are intended to supply a low voltage for measurement, control and protective functions.

The capacitor voltage transformer can be equipped with or without carrier-frequency accessories for power line carrier-frequency (PLC) application at carrier frequencies from 30 kHz to 500 kHz.

The base requirements for coupling capacitors and capacitors dividers are defined in IEC 60358. The transmission requirements for coupling devices for power line carrier (PLC) system are defined in IEC 60481.

The measurement application includes both indication measuring and revenue measuring.

NOTE 501 Diagrams of capacitor voltage transformer to which this standard applies are given in Figures 5A.1 and 5A.2.

2 Normative references

Clause 2 of IEC 61869-1:2007 is applicable with the following additions:

IEC 61869-1:2007, *Instrument transformers – Part 1: General requirements*

IEC 60038 ed7.0 (2009-06) – *IEC standard voltages*

IEC 60060-1, *High-voltage test techniques – Part 1: General definitions and test requirements*

IEC 60050-436, *International Electrotechnical Vocabulary (IEV) – Chapter 436: Power capacitors*

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

IEC 60050-604, *International Electrotechnical Vocabulary (IEV) – Chapter 604: Generation, transmission and distribution of electricity – Operation*

IEC 60358, *Coupling capacitors and capacitor dividers*

IEC 60481, *Coupling devices for power line carrier systems*

3 Terms and Definitions

For the purpose of this document, the terms and definitions of IEC 61869-1 apply with the following additions:

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

[Product Page](#)

-
- [Looking for additional Standards? Visit Intertek Inform Infostore](#)
 - [Learn about LexConnect, All Jurisdictions, Standards referenced in Australian legislation](#)
-