

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Instrument transformers –
Part 5: Additional requirements for capacitor voltage transformers

Transformateurs de mesure –
Partie 5: Exigences supplémentaires concernant les transformateurs
condensateurs de tension

STANDARD PREVIEW
(standards.iteh.ai)

IEC 61869-5:2011

[https://standards.iteh.ai/catalog/standards/sis/25220322-0061-4c0d-ac4d-](https://standards.iteh.ai/catalog/standards/sis/25220322-0061-4c0d-ac4d-6880b2a21fbb/iec-61869-5-2011)

6880b2a21fbb/iec-61869-5-2011



THIS PUBLICATION IS COPYRIGHT PROTECTED

Copyright © 2011 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 la CEI ou du Comité national de la CEI du pays du demandeur.

Si vous avez des questions sur le copyright de la CEI ou si vous désirez obtenir des droits supplémentaires sur cette publication, utilisez les coordonnées ci-après ou contactez le Comité national de la CEI de votre pays de résidence.

IEC Central Office
3, rue de Varembe
CH-1211 Geneva 20
Switzerland
Email: inmail@iec.ch
Web: 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.

- Catalogue of IEC publications: www.iec.ch/searchpub

The IEC on-line Catalogue enables you to search by a variety of criteria (reference number, text, technical committee,...). It also gives information on projects, withdrawn and replaced publications.

- IEC Just Published: www.iec.ch/online_news/justpub

Stay up to date on all new IEC publications. Just Published details twice a month all new publications released. Available on-line and also by email.

[IEC 61869-5:2011](mailto:IEC.61869-5.2011@iec.ch)

- Electropedia: www.electropedia.org

The world's leading online dictionary of electronic and electrical terms containing more than 20 000 terms and definitions in English and French, with equivalent terms in additional languages. Also known as the International Electrotechnical Vocabulary online.

- Customer Service Centre: www.iec.ch/webstore/custserv

If you wish to give us your feedback on this publication or need further assistance, please visit the Customer Service Centre FAQ or contact us:

Email: csc@iec.ch

Tel.: +41 22 919 02 11

Fax: +41 22 919 03 00

A propos de la CEI

La Commission Electrotechnique Internationale (CEI) 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 CEI

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

- Catalogue des publications de la CEI: www.iec.ch/searchpub/cur_fut-f.htm

Le Catalogue en-ligne de la CEI vous permet d'effectuer des recherches en utilisant différents critères (numéro de référence, texte, comité d'études,...). Il donne aussi des informations sur les projets et les publications retirées ou remplacées.

- Just Published CEI: www.iec.ch/online_news/justpub

Restez informé sur les nouvelles publications de la CEI. Just Published détaille deux fois par mois les nouvelles publications parues. Disponible en-ligne et aussi par email.

- Electropedia: www.electropedia.org

Le premier dictionnaire en ligne au monde de termes électroniques et électriques. Il contient plus de 20 000 termes et définitions en anglais et en français, ainsi que les termes équivalents dans les langues additionnelles. Egalement appelé Vocabulaire Electrotechnique International en ligne.

- Service Clients: www.iec.ch/webstore/custserv/custserv_entry-f.htm

Si vous désirez nous donner des commentaires sur cette publication ou si vous avez des questions, visitez le FAQ du Service clients ou contactez-nous:

Email: csc@iec.ch

Tél.: +41 22 919 02 11

Fax: +41 22 919 03 00



IEC 61869-5

Edition 1.0 2011-07

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Instrument transformers –
Part 5: Additional requirements for capacitor voltage transformers

Transformateurs de mesure –
Partie 5: Exigences supplémentaires concernant les transformateurs
condensateurs de tension

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

COMMISSION
ELECTROTECHNIQUE
INTERNATIONALE

PRICE CODE **XA**
CODE PRIX

ICS 17.220.20

ISBN 978-2-88912-543-2

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

iTech STANDARD PREVIEW
(standards.iteh.ai)

<https://standards.iteh.ai/catalog/standards/sist/2322c322-60bf-4c0d-ae4d-6880b2a21fbb/iec-61869-5-2011>

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.

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.

The contents of the corrigendum of August 2015 have been included in this copy.

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

[IEC 61869-5:2011](#)

[https://standards.iteh.ai/catalog/standards/sist/2322c322-60bf-4c0d-ae4d-](https://standards.iteh.ai/catalog/standards/sist/2322c322-60bf-4c0d-ae4d-6880b2a21fb/iec-61869-5-2011)

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:

3.1 General definitions

3.1.501

capacitor voltage transformer

CVT

voltage transformer comprising a capacitor divider unit and an electromagnetic unit so designed and interconnected that the secondary voltage of the electromagnetic unit is substantially proportional to the primary voltage, and differs in phase from it by an angle which is approximately zero for an appropriate direction of the connections.

[IEC 60050-321:1986, 321-03-14, modified]

3.1.502

measuring voltage transformer

voltage transformer intended to transmit an information signal to measuring instruments, integrating meters and similar apparatus

[IEC 60050-321:1986 , 321-03-04 modified]

3.1.503

protective voltage transformer

voltage transformer intended to transmit an information signal to electrical protective and control devices

[IEC 60050-321:1986 , 321-03-05]

3.1.504

secondary winding

winding which supplies the voltage circuits of measuring instruments, meters, protective or control devices

[IEC 60050-321:1986, 321-01-07 modified]

3.1.505

residual voltage winding

winding of a single-phase capacitor voltage transformer intended, in a set of three single-phase transformers, for connection in broken delta for the purpose of producing a residual voltage under earth-fault conditions.

[IEC 60050-321:1986, 321-03-11]

3.1.506

rated temperature category of a capacitor voltage transformer

range of temperature of the ambient air or of the cooling medium for which the capacitor voltage transformer has been designed

3.1.507

line terminal

terminal intended for connection to a line conductor of a network

[IEC 60050-436:1986, 436-03-01]

3.1.508

ferro-resonance

sustained resonance of a circuit consisting of a capacitance with a non-linear saturable magnetic inductance and a voltage ac-source for excitation

NOTE 501 The ferro-resonance can be initiated by switching operations on the primary side or secondary side.

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[IEC 61869-5:2011](https://standards.iteh.ai/catalog/standards/sist/2322c322-60bf-4c0d-ae4d-68802a21fbb/iec-61869-5-2011)

<https://standards.iteh.ai/catalog/standards/sist/2322c322-60bf-4c0d-ae4d-68802a21fbb/iec-61869-5-2011>

3.1.509

transient response

measured fidelity of the secondary-voltage waveform, compared with the voltage waveform at the high-voltage terminal under transient conditions

3.1.510

voltage-connected CVT

CVT which has only one connection to the high voltage line

NOTE 501 Under normal conditions the top connection carries only the current of the capacitor voltage transformer.

3.1.511

current-connected CVT

CVT which has two connections to the high voltage line

NOTE 501 The terminals and the top connection are designed to carry the line current under normal conditions.

3.1.512

line trap-connected CVT

CVT which supports a line trap on its top

3.1.513

capacitor

two terminal device characterized essentially by its capacitance

[IEC 60050-151:2001, 151-13-28]

3.1.514

(capacitor) element

device consisting essentially of two electrodes separated by a dielectric

[IEC 60050-436:1986, 436-01-03]

3.1.515

(capacitor) unit

assembly of one or more capacitor elements in the same container with terminals brought out

[IEC 60050-436:1986, 436-01-04]

NOTE 501 A common type of unit for coupling capacitors has a cylindrical housing of insulating material and metallic flanges which serve as terminals.

3.1.516

(capacitor) stack

an assembly of capacitor units connected in series

[IEC 60050-436:1986, 436-01-05]

NOTE 501 The capacitor units are usually mounted in a vertical array.

3.1.517

capacitor voltage divider

capacitor stack forming an alternating voltage divider

[IEC 60050-436:1986, 436-02-10]

3.1.518

rated capacitance of a capacitor

C_r

the capacitance value for which the capacitor has been designed

NOTE 501 This definition applies:

- for a capacitor unit, to the capacitance between the terminals of the unit;
- for a capacitor stack, to the capacitance between line and low voltage terminals or between line and earth terminals of the stack;
- for a capacitor divider, to the resultant capacitance: $C_r = C_1 \times C_2 / (C_1 + C_2)$.

3.1.519

coupling capacitor

capacitor used for the transmission of signals in a power system

[IEV 60050-436:1986, 436-02-11]

3.1.520

high voltage capacitor (of a capacitor divider)

C_1

capacitor connected between the high voltage terminal and the intermediate voltage terminal of a capacitor divider

[IEC 60050-436:1986, 436-02-12]

3.1.521

intermediate voltage capacitor (of a capacitor divider)

C_2

capacitor connected between the intermediate voltage and the low voltage terminals of a capacitor divider

[IEC 60050-436:1986, 436-02-13]

3.1.522

intermediate voltage terminal (of a capacitor divider)

terminal intended for connection to an intermediate circuit such as the electromagnetic unit of a capacitor voltage transformer

[IEC 60050-436:1986, 436-03-03]

3.1.523

low voltage terminal of a capacitor divider

terminal intended for connection to earth either directly or via an impedance of negligible value at network frequency.

NOTE 501 in a coupling capacitor, this terminal is connected to the signal transmitting device.

[IEC 60050-436:1986, C 436-03-04]

3.1.524

capacitance tolerance

permissible difference between the actual capacitance and the rated capacitance under specified conditions

[IEC 60050-436:1986, 436-04-01]

3.1.525

equivalent series resistance of a capacitor

virtual resistance which, if connected in series with an ideal capacitor of capacitance value equal to that of the capacitor in question, would have a power loss equal to the active power dissipated in that capacitor under specified operating conditions at a given high frequency

3.1.526

high frequency capacitance (of a capacitor)

effective capacitance at a given frequency resulting from the joint effect of the intrinsic capacitance and the self-inductance of the capacitor

[IEC 60050-436:1986, 436-04-03]

3.1.527

intermediate voltage of a capacitor divider

U_C

voltage between the intermediate voltage terminal of the capacitor divider and the low voltage terminal, when the primary voltage is applied between the high and low voltage terminals or high voltage terminal and earth terminal

3.1.528

voltage ratio (of a capacitor divider)

K_C

ratio of the voltage applied to the capacitor divider to the open-circuit intermediate voltage

[IEC 60050-436:1986, 436-04-05]

NOTE 501 This ratio corresponds to the sum of the capacitances of the high voltage and intermediate voltage capacitors divided by the capacitance of the high voltage capacitor: $(C_1 + C_2) / C_1 = K_C$.

NOTE 502 C_1 and C_2 include the stray capacitances, which are generally negligible.

3.1.529

capacitor losses

active power dissipated in the capacitor

[IEC 60050-436:1986, 436-04-10]

[IEC 61869-5:2011](#)

<https://standards.iteh.ai/catalog/standards/sist/2322c322-60bf-4c0d-ae4d-6880b2a21fbb/iec-61869-5-2011>

3.1.530

tangent of the loss angle (tanδ) of a capacitor

ratio between the active power P_a and the reactive power P_r : $\tan\delta = P_a/P_r$

3.1.531

temperature coefficient of capacitance

T_C

fractional change of the capacitance for a given change in temperature:

$$T_C = \frac{\Delta C}{\Delta T \times C_{20^\circ}} \left[\frac{1}{K} \right]$$

ΔC represents the observed change in capacitance over the temperature interval ΔT

C_{20° represents the capacitance measured at 20 °C

NOTE 501 The term $\Delta C/\Delta T$ according to this definition is usable only if the capacitance is an approximate linear function of the temperature in the range under consideration. If not, the temperature dependency of the capacitance should be shown in a graph or a table.

3.1.532

stray capacitance of the low voltage terminal

stray capacitance between the low voltage terminal and the earth terminal

3.1.533

stray conductance of the low voltage terminal

stray conductance between the low voltage terminal and the earth terminal

3.1.534**dielectric of a capacitor**

insulating material between the electrodes

3.1.535**electromagnetic unit**

component of a capacitor voltage transformer, connected between the intermediate voltage terminal and the earth terminal of the capacitor divider (or possibly directly connected to earth when a carrier-frequency coupling device is used) which supplies the secondary voltage

NOTE 501 An electromagnetic unit typically comprises a transformer to reduce the intermediate voltage to the required value of secondary voltage, and a compensating inductance. The reactance $L \cdot (2\pi f_R)$ of the compensating inductance must be approximately equal at rated frequency f_R to the capacitive reactance $1/[2\pi f_R \cdot (C_1 + C_2)]$ of the two parts of the divider connected in parallel. The compensating inductance may be incorporated wholly or partially in the transformer.

3.1.536**intermediate transformer**

voltage transformer in which the secondary voltage, in normal conditions of use, is substantially proportional to the primary voltage

3.1.537**compensating inductance**

L

inductance which is usually connected between the intermediate terminal and the high voltage terminal of the primary winding of the intermediate transformer or between earth terminal and the earth-side terminal of the primary winding of the intermediate transformer or incorporated in the primary and secondary windings of the intermediate transformer

NOTE 501

The design value L of the inductance is: $L = \frac{1}{(C_1 + C_2) \times (2\pi f_R)^2}$

3.1.538**damping device**

device incorporated in the electromagnetic unit for the purposes of:

- a) limiting overvoltages which may appear across one or more components;
- b) and/or to prevent sustained ferro-resonance;
- c) and or to achieve a higher performance of the transient response of the capacitor voltage transformer

3.1.539**carrier-frequency accessories**

circuit element intended to permit the injection of carrier frequency signal and which is connected between the low voltage terminal of a capacitor divider unit and earth, having an impedance which is insignificant at power frequency, but appreciable at the carrier frequency (see Figure 5A.2)

3.1.540**drain coil**

inductance which is connected between the low voltage terminal of a capacitor divider and earth, and whose impedance is insignificant at power frequency, but has a high value at the carrier frequency

3.1.541**voltage limitation element**

element connected across the drain coil or between low voltage terminal of the capacitor voltage divider and earth to limit the transient overvoltages which may appear across the drain coil