



DPC: 23 / 30479106 DC

BSI Group Headquarters

389 Chiswick High Road London W4 4AL

Tel: +44 (0)20 8996 9000

Fax: +44 (0)20 8996 7400

www.bsigroup.com

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Part 21: Uncertainty evaluation in the calibration of Instrument Transformers

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Responsible Committee Secretary: **Ms Nicola Young (BSI)**

Direct tel:

E-mail: nicola.young@bsigroup.com

Introduction

This draft standard is based on national and international discussions. Your comments on this draft are invited and will assist in the preparation of the consequent standard.

For international standards, comments will be reviewed by the relevant UK national committee before sending the consensus UK vote and comments to the international committee, which will then decide appropriate action. If the international standard is approved, it is usual for the text to be published as a British Standard.

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Please indicate whether you consider the UK should submit a negative (with supporting technical reasons) or positive vote on this draft. Please indicate if you are aware of any reason why this draft standard should not be published as a British Standard.

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Template for comments and secretariat observations

Date: xx/xx/20xx	Document: ISO/DIS xxxx
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1	2	(3)	4	5	(6)	7
MB	Clause No./ Subclause No./Annex (e.g. 3.1)	Paragraph/Figure/ Table/Note	Type of comment	Commend (justification for change) by the MB	Proposed change by the MB	Secretariat observations on each comment submitted
	3.1	Definition 1	ed	Definition is ambiguous and needs clarifying.	Amend to read '...so that the mains connector to which no connection...'	
	6.4	Paragraph 2	te	The use of the UV photometer as an alternative cannot be supported as serious problems have been encountered in its use in the UK.	Delete reference to UV photometer.	

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SECRETARIAT:

Italy

SECRETARY:

Mr Filippo Frugoni

OF INTEREST TO THE FOLLOWING COMMITTEES:

TC 1, TC 13, TC 25, TC 42, TC 85, TC 95

PROPOSED HORIZONTAL STANDARD:

☐

Other TC/SCs are requested to indicate their interest, if any, in this CDV to the secretary.

FUNCTIONS CONCERNED:

☐ EMC☐ ENVIRONMENT☐ QUALITY ASSURANCE☐ SAFETY☐ SUBMITTED FOR CENELEC PARALLEL VOTING☒ NOT SUBMITTED FOR CENELEC PARALLEL VOTING

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TITLE:

IEC/IEEE 61869-21 ED1: Instrument transformers - Part 21: Uncertainty evaluation in the calibration of Instrument Transformers

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

INSTRUMENT TRANSFORMERS –

**Part 21: Uncertainty evaluation in the accuracy test
of instrument transformers**

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International Standard IEC/IEEE 61869-21 has been prepared by IEC technical committee 38: Instrument Transformers, in cooperation with IEEE IMS Instrumentation and Measurement Society TC-39 Measurements in Power Systems¹, under the IEC/IEEE Dual Logo Agreement between IEC and IEEE.

This document is published as an IEC/IEEE Dual Logo standard.

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

Draft	Report on voting
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Full information on the voting for its approval can be found in the report on voting indicated in the above table.

The language used for the development of this document is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/publications.

The IEC Technical Committee and IEEE Technical Committee have decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under webstore.iec.ch in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

¹ A list of IEEE participants can be found at the following URL: (to be provided prior to publication).

164

INTRODUCTION

165 Accuracy is a crucial feature of Instrument Transformers (IT) in most cases and applications:
166 its assessment is required since a very long time by the relevant International Standards, which
167 also establish the conventional accuracy requirements in terms of accuracy classes limits.

168 The present International Standard aims at i) providing information on the main sources of
169 uncertainties arising in the setup used to test the accuracy of IT and that need to be taken into
170 account in the evaluation of measurement uncertainty; ii) defining the procedures to be
171 implemented for testing the accuracy of IT, depending on the type of IT (i.e. either with an
172 analogue or a digital secondary signal); iii) defining the procedure for evaluating the uncertainty
173 contributions in testing the accuracy of IT.

INSTRUMENT TRANSFORMERS –

Part 21: Uncertainty evaluation in the accuracy test of instrument transformers

1 Scope

This part of IEC 61869 provides the requirements, the methods and the guidelines to be applied on the evaluation of uncertainty in testing the accuracy of Instrument Transformers (IT) intended for applications where the rated primary voltage is higher than 1 kV (HV) or lower than 1 kV (LV) with an analogue or a digital secondary signal for measuring, protection and control purposes, with rated frequencies from 15 Hz to 400 Hz.

This document covers the uncertainty evaluation in testing the accuracy of IT (including on-site testing of accuracy) independently of the technology used (either inductive or non-inductive).

The document reports on how to take into account the sources of uncertainty in the setups for accuracy tests and how to combine their effects in order to evaluate the uncertainty in the test results.

2 Normative references

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.

IEC 61869 (all parts), *Instrument transformers*

ISO/IEC 17025, *General requirements for the competence of testing and calibration laboratories*

JCGM 100:2008, *Evaluation of measurement data — Guide to the expression of uncertainty in measurement*

3 Terms, definitions, abbreviated terms and symbols

For the purposes of this document, the terms and definitions given in IEC 61869-99 and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

3.1 General definitions

3.1.1 measurement

process of experimentally obtaining one or more values that can reasonably be attributed to a quantity together with any other available relevant information

214 Note 1 to entry: The quantity mentioned in the definition is an individual quantity.

215 Note 2 to entry: The relevant information mentioned in the definition may be about the values obtained by the
216 measurement, such that some may be more representative of the measurand than others.

217 Note 3 to entry: Measurement is sometimes considered to apply to nominal properties, but not in this Vocabulary,
218 where the process of obtaining values of nominal properties is called "examination".

219 Note 4 to entry: Measurement requires both experimental comparison of quantities or experimental counting of
220 entities at some step of the process and the use of models and calculations that are based on conceptual
221 considerations.

222 Note 5 to entry: The conditions of reasonable attribution mentioned in the definition take into account a description
223 of the quantity commensurate with the intended use of a measurement result, a measurement procedure, and a
224 calibrated measuring system operating according to the specified measurement procedure, including the
225 measurement conditions. Moreover, a maximum permissible error and/or a target uncertainty may be specified, and
226 the measurement procedure and the measuring system should then be chosen in order not to exceed these measuring
227 system specifications.

228 [SOURCE: JCGM 200:2012, 2.1, modified – "together with any other available relevant
229 information" has been added to the definition, and the notes to entry have been replaced with
230 new notes to entry.]

231 **3.1.2**
232 **measurand**
233 quantity intended to be measured

234 Note 1 to entry: The measurement, including the measuring system and the conditions under which the
235 measurement is carried out, might change the phenomenon, body, or substance such that the quantity being
236 measured may differ from the measurand as defined. In this case, adequate correction is necessary.

237 [SOURCE: JCGM 200:2012, 2.3, modified – Notes 1 and 2 to entry have been omitted, along
238 with the examples.]

239 **3.1.3**
240 **measurement method**
241 generic description of a logical organization of operations used in a measurement

242 Note 1 to entry: Measurement methods may be qualified in various ways such as:

- 243 – substitution measurement method,
- 244 – differential measurement method, and
- 245 – null measurement method.

246 [SOURCE: JCGM 200:2012, 2.5, modified – The admitted term "method of measurement" has
247 been omitted, including the last two dashed list items in the note.]

248 **3.1.4**
249 **measurement procedure**
250 detailed description of a measurement according to one or more measurement principles and
251 to a given measurement method, based on a measurement model and including any calculation
252 to obtain a measurement result

253 Note 1 to entry: A measurement procedure is usually documented in sufficient detail to enable an operator to
254 perform a measurement.

255 Note 2 to entry: A measurement procedure can include a statement concerning a target measurement uncertainty.

256 [SOURCE: JCGM 200:2012, 2.6, modified – Note 3 to entry has been omitted.]

257 **3.1.5**
258 **measurement result**
259 set of quantity values being attributed to a measurand together with any other available relevant
260 information

Note 1 to entry: A measurement result is generally expressed as a single measured quantity value and a measurement uncertainty.

[SOURCE: JCGM 200:2012, 2.9, modified – The admitted term "result of measurement" has been omitted, along with Notes 1 and 3 to entry and the second sentence of Note 2 to entry.]

3.1.6

measurement uncertainty

non-negative parameter characterizing the dispersion of the quantity values being attributed to a measurand, based on the information used

Note 1 to entry: Measurement uncertainty comprises, in general, many components. Some of these may be evaluated by Type A evaluation of measurement uncertainty from the statistical distribution of the quantity values from series of measurements and can be characterized by standard deviations. The other components, which may be evaluated by Type B evaluation of measurement uncertainty, can also be characterized by standard deviations, evaluated from probability density functions based on experience or other information.

[SOURCE: JCGM 200:2012, 2.26, modified – Synonyms have been omitted, along with Notes 1, 2 and 4 to entry.]

3.1.7

Type A evaluation of measurement uncertainty

evaluation of a component of measurement uncertainty by a statistical analysis of measured quantity values, obtained under defined measurement conditions

Note 1 to entry: For information about statistical analysis, see e.g. JCGM 100:2008 (GUM).

[SOURCE: JCGM 200:2012, 2.28, modified – Synonyms have been omitted, along with Notes 1 and 3 to entry.]

3.1.8

Type B evaluation of measurement uncertainty

evaluation of a component of measurement uncertainty determined by means other than a Type A evaluation of measurement uncertainty

EXAMPLES Evaluation based on information

- associated with authoritative published quantity values;
- associated with the quantity value of a certified reference material;
- obtained from a calibration certificate;
- about drift;
- obtained from the accuracy class of a verified measuring instrument;
- obtained from limits deduced through personal experience.

[SOURCE: JCGM 200:2012, 2.29, modified – Note 1 to entry has been omitted.]

3.1.9

standard measurement uncertainty

standard uncertainty

“

measurement uncertainty expressed as a standard deviation

Note 1 to entry: The standard measurement uncertainty term is usually shortened in standard uncertainty.

[SOURCE: JCGM 200:2012, 2.30, modified – Symbol has been added, a synonym has been omitted, Note 1 to entry added.]