



SLOVENSKI STANDARD
SIST EN 60044-6:2001
01-marec-2001

Instrument transformers - Part 6: Requirements for protective current transformers for transient performance

Instrument transformers -- Part 6: Requirements for protective current transformers for transient performance

Meßwandler -- Teil 6: Anforderungen an Stromwandler für Schutzzwecke für transientes Übertragungsverhalten

Transformateurs de mesure -- Partie 6: Prescriptions concernant les transformateurs de courant pour protection pour la réponse en régime transitoire

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Ta slovenski standard je istoveten z: EN 60044-6:1999

ICS:

17.220.20	T ^ b } b ^ Á \ d ä } ä ö ä { æ } ^ ç ä ö ^ ä ä	Measurement of electrical and magnetic quantities
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EUROPEAN STANDARD

EN 60044-6

NORME EUROPÉENNE

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March 1999

ICS 17.220.20

English version

Instrument transformers
Part 6: Requirements for protective current transformers
for transient performance
 (IEC 60044-6:1992, modified)

Transformateurs de mesure
 Partie 6: Prescriptions concernant
 les transformateurs de courant pour
 protection pour la réponse en régime
 transitoire
 (CEI 60044-6:1992, modifiée)

Meßwandler
 Teil 6: Anforderungen an Stromwandler
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This European Standard was approved by CENELEC on 1999-01-01. 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 Central Secretariat 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 Central Secretariat has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

CENELEC

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

Central Secretariat: rue de Stassart 35, B - 1050 Brussels

Foreword

The text of the International Standard IEC 60044-6:1992, prepared by IEC TC 38, Instrument transformers, together with common modifications prepared by the Technical Committee CENELEC TC 38X, Instrument transformers was submitted to the formal vote and was approved by CENELEC as EN 60044-6 on 1999-01-01.

The following dates were 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) 2000-01-01
- latest date by which the national standards conflicting
with the EN have to be withdrawn (dow) 2000-01-01

This part 6 of EN 60044 is to be used in conjunction with IEC 60044-1:1996.

Annexes designated "normative" are part of the body of the standard.
In this standard, annexes A, B, C, D, E and ZA are normative.
Annex ZA has been added by CENELEC.

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Endorsement notice

The text of the International Standard IEC 60044-6:1992 was approved by CENELEC as a European Standard with agreed common modifications as given below.

COMMON MODIFICATIONS**Introduction**

Replace the 1st sentence by the following:

Performance criteria for class P current transformers included in clause 12 of IEC 60044-1 relate to a steady state a.c. symmetrical primary energizing current which allows the limiting secondary e.m.f. to be as defined in 2.2.4 of IEC 60044-1.

1 Scope

Replace the beginning by the following:

This part of IEC 60044 covers the requirements and tests, in addition to those in IEC 60044-1, that are necessary ...

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2 Normative references

Replace "IEC 185:1987, Current transformers" by:

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[0bc3334456/sist-en-60044-6-2001](https://standards.iteh.ai/catalog/standards/sist/e7032fa3-764e-4f06-97d5-0bc3334456/sist-en-60044-6-2001)
IEC 60044-1:1996 Instrument transformers -- Part 1: Current transformers

4 Ratings and performance requirements

4.2.2 Replace "4.1 of IEC 185" by "4.1.1 of IEC 60044-1".

6 Marking of rating plate

Replace "clause 23 of IEC 185" by "subclause 10.2 of IEC 60044-1".

Table 3 Replace the first five rows by the following:

CT class	TPS	TPX	TPY	TPZ	References		
					to IEC 60044-1	to IEC 60044-6	Notes
I_{pn}	x	x	x	x	2.1.6	-	1
I_{sn}	x	x	x	x	2.1.7	-	1
I_{th}	x	x	x	x	2.1.27	-	3
I_{dyn}	x	x	x	x	2.1.28	-	3

Annex D, D.1 In the 2nd paragraph,

replace "(see chapter III of IEC 185)" by "(see clause 12 of IEC 60044-1)"

and

"item b) of clause 39 of IEC 185" by "item b) of subclause 12.5 of IEC 60044-1".

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Annex ZA (normative)**Normative references to international publications
with their corresponding European publications**

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

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

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 60044-1	1996	Instrument transformers Part 1: Current transformers	-	-
IEC 60056 (mod) 1987		High-voltage alternating-current circuit-breakers	HD 348 S7 ¹⁾	1998

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1) HD 348 S7 includes A3:1996 to IEC 60056.

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Transformateurs de mesure

Partie 6:

Prescriptions concernant les transformateurs
de courant pour protection pour la réponse
en régime transitoire

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Instrument transformers

Part 6:

Requirements for protective current transformers
for transient performance

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International Electrotechnical Commission
Международная Электротехническая Комиссия

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For price, see current catalogue

CONTENTS

	Page
FOREWORD	5
INTRODUCTION	7
Clause	
1 Scope	9
2 Normative references	9
3 Definitions	9
4 Ratings and performance requirements	17
5 Methods of specification	21
6 Marking of rating plate	23
7 Tests	27
ITeh STANDARD PREVIEW (standards.iteh.ai)	
Annexes	
A Basic theoretical equations for transient dimensioning	35
B Determination of core magnetization characteristic	37
C Direct tests	59
D Guide to performance criteria for current transformer for protection relaying	73
E Determination of turns ratio error	85

INTERNATIONAL ELECTROTECHNICAL COMMISSION

INSTRUMENT TRANSFORMERS

Part 6: Requirements for protective current transformers
for transient performance

FOREWORD

- 1) The formal decisions or agreements of the IEC on technical matters, prepared by Technical Committees on which all the National Committees having a special interest therein are represented, express, as nearly as possible, an international consensus of opinion on the subjects dealt with.
- 2) They have the form of recommendations for international use and they are accepted by the National Committees in that sense.
- 3) In order to promote international unification, the IEC expresses the wish that all National Committees should adopt the text of the IEC recommendation for their national rules in so far as national conditions will permit. Any divergence between the IEC recommendation and the corresponding national rules should, as far as possible, be clearly indicated in the latter.

iTeh STANDARD PREVIEW

This part of International Standard IEC 44 has been prepared by IEC Technical Committee No. 38: Instrument transformers.

SIST EN 60044-6:2001

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

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Six Months' Rule	Reports on Voting	Two Months' Procedure	Report on Voting
38(CO)78	38(CO)81 & 81A	38(CO)83	38(CO)86

Full information on the voting for the approval of this part can be found in the Voting Reports indicated in the above table.

This part of IEC 44 is to be read in conjunction with IEC 185 and its Amendment No. 1.

Annexes A, B, C, D and E form an integral part of this part.

INTRODUCTION

Performance criteria for class P current transformers included in Chapter III of IEC 185 relate to a steady state a.c. symmetrical primary energizing current which allows the limiting secondary e.m.f. to be as defined in 34.5 of IEC 185. In this part of IEC 44, requirements for protective current transformers as classified by 3.5 take account of the additional flux linking the secondary winding due to the d.c. component of energizing current. Strictly, the limiting condition is defined by the integral of the voltage which is induced in the secondary winding of the current transformer in order to drive current in the secondary loop, inclusive of winding and secondary resistance, for the specified energizing conditions. For mathematical convenience, an equivalent sinusoidal e.m.f. is used to define the limiting condition. Refer also to annex B.

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INSTRUMENT TRANSFORMERS

Part 6: Requirements for protective current transformers for transient performance

1 Scope

This part of IEC 44 covers the requirements and tests, in addition to those in Chapter I of IEC 185, that are necessary for inductive current transformers for use with electrical protective schemes in which the prime requirement for the current transformers is the maintenance of a defined performance up to several times the rated current when the current contains an exponentially decaying d.c. component of defined time constant.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this part of IEC 44. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this part of IEC 44 are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

SIST EN 60044-6:2001

IEC 56: 1987, *High-voltage alternating-current circuit-breakers*.

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IEC 185: 1987, *Current transformers*.

3 Definitions

For the purpose of this part of IEC 44, the following definitions apply.

3.1 rated primary short-circuit current (I_{psc}): R.M.S. value of primary symmetrical short-circuit current on which the rated accuracy performance of the current transformer is based.

3.2 instantaneous error current (i_ϵ): Difference between the instantaneous values of the secondary current (i_s) multiplied by the rated transformation ratio (K_n) and the primary current (i_p):

$$i_\epsilon = K_n i_s - i_p$$

When both alternating current and direct current components are present, the constituent components are separately identified as follows:

$$i_\epsilon = i_{\epsilon ac} + i_{\epsilon dc} = (K_n i_{sac} - i_{pac}) + (K_n i_{sdc} - i_{pdc})$$

3.3 peak instantaneous (total) error ($\hat{\epsilon}$): Maximum instantaneous error current, for the specified duty cycle, expressed as a percentage of the peak instantaneous value of the rated primary short-circuit current:

$$\hat{\epsilon} = 100 \hat{i}_e / (\sqrt{2} I_{psc}) \quad (\%)$$

3.4 peak instantaneous alternating current component error (ϵ_{ac}): Maximum instantaneous error of the alternating current component expressed as a percentage of the peak instantaneous value of the rated primary short-circuit current:

$$\hat{\epsilon}_{ac} = 100 \hat{i}_{\epsilon ac} / (\sqrt{2} I_{psc}) \quad (\%)$$

3.5 protective current transformer classes: Current transformers for protection are classified according to functional performance as follows:

class P: Accuracy limit defined by composite error ($\hat{\epsilon}_c$) with steady state symmetrical primary current. No limit for remanent flux.

class TPS: Low leakage flux current transformer for which performance is defined by the secondary excitation characteristics and turns ratio error limits. No limit for remanent flux.

class TPX: Accuracy limit defined by peak instantaneous error ($\hat{\epsilon}$) during specified transient duty cycle. No limit for remanent flux.

class TPY: Accuracy limit defined by peak instantaneous error ($\hat{\epsilon}$) during specified transient duty cycle. Remanent flux not to exceed 10 % of the saturation flux.

class TPZ: Accuracy limit defined by peak instantaneous alternating current component error ($\hat{\epsilon}_{ac}$) during single energization with maximum d.c. offset at specified secondary loop time constant. No requirements for d.c. component error limit. Remanent flux to be practically negligible.

3.6 specified primary time constant (T_p): That specified value of the time constant of the d.c. component of the primary current on which the performance of the current transformer is based. This value may also be a rated value for class TPX, TPY and TPZ current transformers and then will be marked on the rating plate.

3.7 permissible time to accuracy limit (t_{al}): Time during which the specified accuracy is maintained during any specified energization period of a given duty cycle.

NOTE - This time will usually be defined by the critical measuring time of the associated protection scheme. When stable operation of the protection scheme is a limiting requirement, it may also be necessary to consider the time taken by the circuit breaker to interrupt the current.

3.8 **time to maximum flux (t_{\max}):** Elapsed time during a prescribed energization period at which the transient flux in a current transformer core achieves maximum value, it being assumed that saturation of the core does not occur.

3.9 **dead time (during auto-reclosing) (t_{fr}):** Time interval between interruption and re-application of the primary short-circuit current during a circuit breaker auto-reclosing duty cycle (refer also to IEC 56).

3.10 **specified duty cycle (C-0 and/or C-0-C-0):** Duty cycle in which, during each specified energization, the primary energizing current is assumed to be "fully offset" (see note below), with the specified decay time constant (T_p) and be of rated amplitude (I_{psc}).

Duty cycles are as follows:

Single energization: C - t' - 0

Double energization: C - t' - 0 - t_{fr} - C - t'' - 0

(both energizations in the same polarity of flux)

where:

t' is the duration of first current flow: specified accuracy being maintained during time t'_{al} .

t'' is the duration of second current flow: specified accuracy being maintained during time t''_{al} .

NOTE - Specification of partial offset would reduce the required transient factor by an amount approximately proportional to the reduction. For this reason specification of full offset parameters is recommended.

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3.11 **rated resistive burden (R_b):** Rated value of the secondary connected resistive burden in ohms.

3.12 **secondary winding resistance (R_{ct}):** Secondary winding d.c. resistance in ohms, corrected to 75 °C or such other temperature as may be specified.

3.13 **secondary loop resistance (R_s):** Total resistance of the secondary circuit, inclusive of the secondary winding resistance corrected to 75 °C, unless otherwise specified, and inclusive of all external burden connected.

3.14 **rated secondary loop time constant (T_s):** Value of the time constant of the secondary loop of the current transformer obtained from the sum of the magnetizing and the leakage inductances (L_s) and the secondary loop resistance (R_s):

$$T_s = L_s / R_s$$

3.15 **rated symmetrical short-circuit current factor (K_{ssc}):** The ratio:

$$K_{ssc} = I_{psc} / I_{pn}$$