

SLOVENSKI STANDARD

SIST EN 60044-2:2001

01-marec-2001

BUXca Yý U
SIST HD 554 S1:1995

Merilni transformatorji - 2. del: Induktivni napetostnik (IEC 60044-2:1997, spremenjen)

Instrument transformers -- Part 2: Inductive voltage transformers

Messwandler -- Teil 2: Induktive Spannungswandler

Transformateurs de mesure -- Partie 2: Transformateurs inductifs de tension

Ta slovenski standard je istoveten z: EN 60044-2:1999

ICS:

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

SIST EN 60044-2:2001

en

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EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 60044-2

March 1999

ICS 29.180

Supersedes HD 554 S1:1992

English version

Instrument transformers
Part 2: Inductive voltage transformers
(IEC 60044-2:1997, modified)

Transformateurs de mesure
Partie 2: Transformateurs inductifs
de tension
(CEI 60044-2:1997, modifiée)

Meßwandler
Teil 2: Induktive Spannungswandler
(IEC 60044-2:1997, modifiziert)

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.

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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 60044-2:1997, 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 60044-2 on 1999-01-01.

This European Standard supersedes HD 554 S1:1992.

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) 2002-01-01

Annexes designated "normative" are part of the body of the standard.

In this standard, annex ZA is normative.

Annex ZA has been added by CENELEC.

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Endorsement notice

The text of the International Standard IEC 60044-2:1997 was approved by CENELEC as a European Standard with agreed common modifications as given below.

COMMON MODIFICATIONS**1 General****1.1 Add at the end of the scope:**

Instrument transformers (ITs) are considered to be passive elements.

NOTE: For outdoor ITs having voltages ≥ 123 kV the RIV measurements are suitable to cover the requirements of the EMC Directive. For a guidance of the test procedure EN 60694:1996, § 6.3 might be followed.

Consider the note as main text and add the following sentence at the end:

Three-phase inductive voltages transformers are covered by HD 587 S1.

6 Design requirements

Table 5 **Replace the 3rd row of values by the following:**

420	950	1300
	1050	1425

11 Markings

11.2.2 Replace the 1st sentence by the following:

The preferred terminal markings of inductive voltage transformers are given in figures 6 to 15 as appropriate.

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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 60028	1925	International standard of resistance for copper	-	-
IEC 60038 (mod)	1983	IEC standard voltages ¹⁾	HD 472 S1	1989
IEC 60050(321)	1986	International electrotechnical vocabulary Chapter 321: Instrument transformers	-	-
IEC 60060-1 + corr. March	1989 1990	High-voltage test techniques Part 1: General definitions and test requirements	HD 588.1 S1	1991
IEC 60071-1	1993	Insulation co-ordination Part 1: Definitions, principles and rules	EN 60071-1	1995
IEC 60085	1984	Thermal evaluation and classification of electrical insulation	HD 566 S1	1990
IEC 60270	1981	Partial discharge measurements	-	-
IEC 60721	series	Classification of environmental conditions	EN 60721 HD 478	series series
IEC 60815	1986	Guide for the selection of insulators in respect of polluted conditions	-	-
-	-	Instruments transformers - Three-phase voltage transformers for voltage levels having U_m up to 52 kV	HD 587 S1	1993

1) The title of HD 472 S1 is: Nominal voltages for low-voltage public electricity supply systems.

**NORME
INTERNATIONALE
INTERNATIONAL
STANDARD**

**CEI
IEC**

60044-2

Première édition
First edition
1997-02

Transformateurs de mesure –

**Partie 2:
Transformateurs inductifs de tension**

Instrument transformers –

**Part 2:
Inductive voltage transformers**

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Commission Electrotechnique Internationale
International Electrotechnical Commission
Международная Электротехническая Комиссия

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

INSTRUMENT TRANSFORMERS –

Part 2: Inductive voltage transformers

FOREWORD

- 1) The IEC (International Electrotechnical Commission) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of the 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, the IEC publishes International Standards. 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. The 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 the 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 National Committees.
- 3) The documents produced have the form of recommendations for international use and are published in the form of standards, technical reports or guides and they are accepted by the National Committees in that sense.
- 4) In order to promote international unification, IEC National Committees undertake to apply IEC International Standards transparently to the maximum extent possible in their national and regional standards. Any divergence between the IEC Standard and the corresponding national or regional standard shall be clearly indicated in the latter.
- 5) The IEC provides no marking procedure to indicate its approval and cannot be rendered responsible for any equipment declared to be in conformity with one of its standards.
- 6) Attention is drawn to the possibility that some of the elements of this International Standard may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 60044-2 has been prepared by IEC technical committee 38: Instrument transformers.

This standard cancels and replaces the second edition of IEC 186 (1987), its amendment 1 (1988) and amendment 2 (1995) only as far as the inductive voltage transformers are concerned. IEC 186 remains in force for the capacitor voltage transformers.

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

FDIS		Report on voting	
38/162/FDIS		38/175/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.

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INSTRUMENT TRANSFORMERS –

Part 2: Inductive voltage transformers

1 General

1.1 Scope

This part of IEC 44 applies to new inductive voltage transformers for use with electrical measuring instruments and electrical protective devices at frequencies from 15 Hz to 100 Hz.

Although this standard relates basically to transformers with separate windings, it is also applicable, where appropriate, to auto-transformers. This standard does not apply to transformers for use in laboratories.

NOTE – Requirements specific to three-phase voltage transformers are not included in this standard but, so far as they are relevant, the requirements in clauses 3 to 11 apply to these transformers and a few references to them are included in those clauses (e.g. see 2.1.4, 5.1.1, 5.2, and 11.2).

Clause 13 covers the requirements and tests, in addition to those in clauses 3 to 12, that are necessary for single-phase inductive protective voltage transformers. The requirements of clause 13 apply particularly to transformers which are required to have sufficient accuracy to operate protective systems at voltages that occur under fault conditions.

1.2 Normative references

The following normative documents 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 normative documents 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 normative documents indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

IEC 28: 1925, *International standard of resistance for copper*

IEC 38: 1983, *IEC standard voltages*

IEC 50(321): 1986, *International Electrotechnical Vocabulary – Chapter 321: Instrument transformers*

IEC 60-1: 1989, *High-voltage test techniques – Part 1: General definitions and test requirements*

IEC 71-1: 1993, *Insulation co-ordination – Part 1: Definitions, principles and rules*

IEC 85: 1984, *Thermal evaluation and classification of electrical insulation*
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IEC 270: 1981, *Partial discharge measurements*

IEC 721: *Classification of environmental conditions*

IEC 815: 1986, *Guide for the selection of insulators in respect of polluted conditions*

2 Definitions

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

2.1 General definitions

2.1.1 instrument transformer: A transformer intended to supply measuring instruments, meters, relays and other similar apparatus. [IEV 321-01-01 modified]

2.1.2 voltage transformer: An instrument transformer in which the secondary voltage, in normal conditions of use, 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. [IEV 321-03-01]

2.1.3 unearthed voltage transformer: A voltage transformer which has all parts of its primary winding, including terminals, insulated from earth to a level corresponding to its rated insulation level.

2.1.4 earthed voltage transformer: A single-phase voltage transformer which is intended to have one end of its primary winding directly earthed or a three-phase voltage transformer which is intended to have the star-point of its primary winding directly earthed.

2.1.5 primary winding: The winding to which the voltage to be transformed is applied.

2.1.6 secondary winding: The winding which supplies the voltage circuits of measuring instruments, meters, relays or similar apparatus.

2.1.7 secondary circuit: The external circuit supplied by the secondary winding of a transformer.

2.1.8 rated primary voltage: The value of the primary voltage which appears in the designation of the transformer and on which its performance is based. [IEV 321-01-12 modified]

2.1.9 rated secondary voltage: The value of the secondary voltage which appears in the designation of the transformer and on which its performance is based. [IEV 321-01-16 modified]

2.1.10 actual transformation ratio: The ratio of the actual primary voltage to the actual secondary voltage. [IEV 321-01-18 modified]

2.1.11 rated transformation ratio: The ratio of the rated primary voltage to the rated secondary voltage. [IEV 321-01-20 modified]

2.1.12 voltage error (ratio error): The error which a transformer introduces into the measurement of a voltage and which arises when the actual transformation ratio is not equal to the rated transformation ratio. [IEV 321-01-22 modified]

The voltage error, expressed in per cent, is given by the formula:

$$\text{voltage error \%} = \frac{K_n U_s - U_p}{U_p} \times 100$$

where

K_n is the rated transformation ratio;

U_p is the actual primary voltage;

U_s is the actual secondary voltage when U_p is applied under the conditions of measurement.

2.1.13 phase displacement: The difference in phase between the primary voltage and the secondary voltage vectors, the direction of the vectors being so chosen that the angle is zero for a perfect transformer. [IEV 321-01-23 modified]

The phase displacement is said to be positive when the secondary voltage vector leads the primary voltage vector. It is usually expressed in minutes or centiradians.

NOTE – This definition is strictly correct for sinusoidal voltages only.

2.1.14 accuracy class: A designation assigned to a voltage transformer, the errors of which remain within specified limits under prescribed conditions of use.

2.1.15 burden: The admittance of the secondary circuit expressed in siemens and power factor (lagging or leading).

NOTE – The burden is usually expressed as the apparent power in voltamperes, absorbed at a specified power factor and at the rated secondary voltage.

2.1.16 rated burden: The value of the burden on which the accuracy requirements of this specification are based.

2.1.17 output

2.1.17.1 rated output: The value of the apparent power (in voltamperes at a specified power factor) which the transformer is intended to supply to the secondary circuit at the rated secondary voltage and with rated burden connected to it. [IEV 321-01-27 modified]

2.1.17.2 thermal limiting output: The value of the apparent power referred to rated voltage which can be taken from a secondary winding, at rated primary voltage applied, without exceeding the limits of temperature rise of 5.4.

NOTES

- 1 In this condition the limits of error may be exceeded.
- 2 In the case of more than one secondary winding, the thermal limiting output is to be given separately.
- 3 The simultaneous use of more than one secondary winding is not admitted unless there is an agreement between manufacturer and purchaser.

2.1.18 highest voltage for equipment: The highest r.m.s. phase-to-phase voltage for which a transformer is designed in respect of its insulation.

2.1.19 rated insulation level: The combination of voltage values which characterizes the isolation of a transformer with regard to its capability to withstand dielectric stresses.

2.1.20 isolated neutral system: A system where the neutral point is not intentionally connected to earth, except for high impedance connections for protection or measurement purposes. [IEV 601-02-24]

2.1.21 solidly earthed neutral system: A system whose neutral point(s) is(are) earthed directly. [IEV 601-02-25]

2.1.22 impedance earthed (neutral) system: A system whose neutral point(s) is(are) earthed through impedances to limit earth fault currents. [IEV 601-02-26]

2.1.23 resonant earthed (neutral) system: A system in which one or more neutral points are connected to earth through reactances which approximately compensate the capacitive component of a single-phase-to-earth fault current. [IEV 601-02-27]

NOTE – With resonant earthing of a system, the residual current in the fault is limited to such an extent that an arcing fault in air is self-extinguishing.

2.1.24 earth fault factor: At a given location of a three-phase system, and for a given system configuration, the ratio of the highest r.m.s. phase-to-earth power frequency voltage on a healthy phase during a fault to earth affecting one or more phases at any point on the system to the r.m.s. phase-to-earth power frequency voltage which would be obtained at the given location in the absence of any such fault. [IEV 604-03-06]