SLOVENSKI STANDARD
SIST EN 62044-3:2002

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Cores made of soft magnetic materials - Measuring methods - Part 3: Magnetic properties at high excitation level (IEC 62044-3:2000)

Cores made of soft magnetic materials - Measuring methods -- Part 3: Magnetic properties at high excitation level

Kerne aus weichmagnetischen Materialien - Messverfahren -- Teil 3: Messungen der magnetischen Eigenschaften im Leistungsapplikationsbereich

Noyaux en matériaux magnétiques doux - Méthodes de mesure -- Partie 3: Propriétés magnétiques à niveau élevé d'excitation

Ta slovenski standard je istoveten z: **EN 62044-3:2001**

ICS:

17.220.20	Merjenje električnih in magnetnih veličin	Measurement of electrical and magnetic quantities
29.100.10	Magnetne komponente	Magnetic components

SIST EN 62044-3:2002 **en**

EUROPEAN STANDARD **EN 62044-3**

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ICS 29.030; 29.100.10

English version

Cores made of soft magnetic materials - Measuring methods Part 3: Magnetic properties at high excitation level

(IEC 62044-3:2000)

Noyaux en matériaux magnétiques doux - Méthodes de mesure
Partie 3: Propriétés magnétiques à niveau élevé d'excitation
(CEI 62044-3:2000)

Kerne aus weichmagnetischen Materialien - Messverfahren
Teil 3: Messungen der magnetischen Eigenschaften im Leistungsapplikationsbereich
(IEC 62044-3:2000)

This European Standard was approved by CENELEC on 2001-03-01. 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

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Foreword

The text of document 51/573/FDIS, future edition 1 of IEC 62044-3, prepared by IEC TC 51, Magnetic components and ferrite materials, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 62044-3 on 2001-03-01.

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) 2001-12-01
- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 2004-03-01

Annexes designated "normative" are part of the body of the standard.
Annexes designated "informative" are given for information only.
In this standard, annex ZA is normative and annexes A to E are informative.
Annex ZA has been added by CENELEC.

Endorsement notice

The text of the International Standard IEC 62044-3:2000 was approved by CENELEC as a European Standard without any modification.

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.

Publication	Year	Title	EN/HD	Year
IEC 60050-221	1990	International electrotechnical vocabulary Chapter 221: Magnetic materials and components	-	-
A1	1993		-	-
A2	1999		-	-
IEC 60205	1966	Calculation of the effective parameters of magnetic piece parts	-	-
IEC 60367-1	1982	Cores for inductors and transformers for telecommunications Part 1: Measuring methods	-	-
IEC 60401	1993	Ferrite materials - Guide on the format of data appearing in manufacturers' catalogues of transformer and inductor cores	-	-
IEC 60404-8-6	1999	Magnetic materials Part 8-6: Specifications for individual materials - Soft magnetic metallic materials	-	-
IEC 61332	1995	Soft ferrite material classification	EN 61332	1997

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Part 3: Magnetic properties at high excitation level

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

CORES MADE OF SOFT MAGNETIC MATERIALS – MEASURING METHODS –

Part 3: Magnetic properties at high excitation level

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 specifications, 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. The IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 62044-3 has been prepared by IEC technical committee 51: Magnetic components and ferrite materials.

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

FDIS	Report on voting
51/573/FDIS	51/583/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 3.

Annexes A, B, C, D, and E are for information only.

IEC 62044, presented under the general title *Cores made of soft magnetic materials – Measuring methods,* will include the following parts:

Part 1: Generic specification (under consideration)

Part 2: Magnetic properties at low excitation level (under consideration)

Part 3: Magnetic properties at high excitation level

Part 4: Non-magnetic properties (under consideration)

Part 3 is the first to be published. IEC 60367-1 and IEC 60367-2 will be cancelled after parts 1, 2 and 3 of IEC 62044 are published.

This standard cancels and replaces 11.2 and annex J of IEC 60367-1. The remaining clauses of IEC 60367-1 will be replaced by IEC 62044-1 and IEC 62044-2.

The committee has decided that the contents of this publication will remain unchanged until 2006. At this date, the publication will be

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

CORES MADE OF SOFT MAGNETIC MATERIALS – MEASURING METHODS –

Part 3: Magnetic properties at high excitation level

1 Scope

This standard provides measuring methods for power loss and amplitude permeability of magnetic cores forming the closed magnetic circuits intended for use at high excitation levels in inductors, chokes, transformers and similar devices for power electronics applications.

The methods given in this standard can cover the measurement of magnetic properties for frequencies ranging practically from d.c. to 10 MHz, and even possibly higher, for the calorimetric and reflection methods. The applicability of the individual methods to specific frequency ranges is dependent on the level of accuracy that is to be obtained.

The methods in this standard are basically the most suitable for sine-wave excitations. Other periodic waveforms can also be used; however, adequate accuracy can only be obtained if the measuring circuitry and instruments used are able to handle and process the amplitudes and phases of the signals involved within the frequency spectrum corresponding to the given induction and field strength waveforms with only slightly degraded accuracy.

NOTE It may be necessary for some magnetically soft metallic materials to follow specific general principles, customary for these materials, related to the preparation of specimens and prescribed calculations. These principles are formulated in IEC 60404-8-6.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of IEC 62044. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this part of IEC 62044 are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of IEC and ISO maintain registers of currently valid International Standards.

IEC 60050(221):1990, *International Electrotechnical Vocabulary (IEV) – Chapter 221: Magnetic materials and components*
Amendment 1 (1993)
Amendment 2 (1999)

IEC 60205:1966, *Calculation of the effective parameters of magnetic piece parts*

IEC 60367-1:1982, *Cores for inductors and transformers for telecommunications – Part 1: Measuring methods*

IEC 60401:1993, *Ferrite materials – Guide on the format of data appearing in manufacturers' catalogues of transformer and inductor cores*

IEC 60404-8-6:1999, *Magnetic materials – Part 8-6: Specifications for individual materials – Soft magnetic metallic materials*

IEC 61332:1995, *Soft ferrite material classification*

3 Terms, definitions and symbols

3.1 Definitions

For the purposes of this International Standard, the following definitions apply in addition to those of IEC 60050(221).

3.1.1
(effective) amplitude permeability (symbols: amplitude permeability: μ_a, effective amplitude permeability: μ_{ea})

magnetic permeability obtained from the peak value of the effective magnetic induction, $\hat{B}_e$, and the peak value of the magnetic field strength, $\hat{H}_e$, at the stated value of either, when the magnetic induction and magnetic field vary periodically with time and with an average of zero, and the material is initially in a specified neutralized state

NOTE 1 This definition differs from that of IEC 60050 [221-03-07].

NOTE 2 Two amplitude permeabilities are in common use, namely:

– that in which the peak values apply to the actual waveforms of the induction and field strength,
– that in which the peak values apply to the fundamental components of waveforms of the induction and the field strength.

NOTE 3 The induction and the field strength and, consequently, the amplitude permeability may even be quasi-static quantities, provided the core is cyclically magnetized and no excursion of the B-H curve appears.

3.1.2
maximum (effective) amplitude permeability (symbol $\mu_{ea\ max}$)

maximum value of the (effective) amplitude permeability when the amplitude of excitation ($\hat{B}_e$ or $\hat{H}_e$) is varied

NOTE This definition differs from that of IEC 60050 [221-03-10].

3.1.3
excitation

either induction or field strength for which the waveform and amplitude both remain within the specified tolerance

NOTE When the induction (field strength) mode of excitation is chosen, the resultant waveform of field strength (induction) may be distorted with respect to the excitation waveform due to the non-linear behaviour of the magnetic material.

3.1.4
high excitation level

excitation at which the permeability depends on excitation amplitude (particularly at low frequencies) and/or at which the power loss results in a noticeable temperature rise (particularly at high frequencies)

3.1.5
sinusoidal excitation

excitation of harmonic content of less than 1 %

3.1.6
exciting winding

winding of measuring coil to which the exciting voltage is applied or through which the exciting current is flowing