SLOVENSKI STANDARD
SIST EN IEC 62044-3:2023

01-november-2023

Jedra iz mehkomagnetnih materialov - Merilne metode - 3. del: Magnetne lastnosti pri močnem vzbujanju

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

iTeh STANDARD PREVIEW
(standards.iteh.ai)
SIST EN IEC 62044-3:2023
https://standards.iteh.ai/catalog/standards/sist/a0bdaf6b-6f48-4cda-b7c2-ba1d77e153d4/sist-en-iec-62044-3-2023

Ta slovenski standard je istoveten z: **EN IEC 62044-3:2023**

ICS:

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

SIST EN IEC 62044-3:2023 **en**

2003-01.Slovenski inštitut za standardizacijo. Razmnoževanje celote ali delov tega standarda ni dovoljeno.

SIST EN IEC 62044-3:2023

iTeh STANDARD PREVIEW
(standards.iteh.ai)

SIST EN IEC 62044-3:2023
https://standards.iteh.ai/catalog/standards/sist/a0bdaf6b-6f48-4cda-b7c2-ba1d77e153d4/sist-en-iec-62044-3-2023

SIST EN IEC 62044-3:2023

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN IEC 62044-3

September 2023

ICS 29.030; 29.100.10

Supersedes EN 62044-3:2001;
EN 62044-3:2001/AC:2021-11

English Version

Cores made of soft magnetic materials - Measuring methods - Part 3: Magnetic properties at high excitation level (IEC 62044-3:2023)

Noyaux en matériaux magnétiques doux - Méthodes de mesure - Partie 3: Propriétés magnétiques à niveau élevé d'excitation
(IEC 62044-3:2023)

Kerne aus weichmagnetischen Materialien - Messverfahren - Teil 3: Messungen der magnetischen Eigenschaften im Leistungsapplikationsbereich
(IEC 62044-3:2023)

This European Standard was approved by CENELEC on 2023-08-11. 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 CEN-CENELEC Management Centre 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 CEN-CENELEC Management Centre has the same status as the official versions.

iTeh STANDARD PREVIEW
(standards.iteh.ai)
SIST EN IEC 62044-3:2023

CENELEC members are the national electrotechnical committees of Austria, Belgium, Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Türkiye and the United Kingdom.

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

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

© 2023 CENELEC All rights of exploitation in any form and by any means reserved worldwide for CENELEC Members.

Ref. No. EN IEC 62044-3:2023 E

SIST EN IEC 62044-3:2023

European foreword

The text of document 51/1426/CDV, future edition 2 of IEC 62044-3, prepared by IEC/TC 51 "Magnetic components, ferrite and magnetic powder materials" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN IEC 62044-3:2023.

The following dates are fixed:

- latest date by which the document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2024-05-11
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2026-08-11

This document supersedes EN 62044-3:2001 and all of its amendments and corrigenda (if any).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CENELEC shall not be held responsible for identifying any or all such patent rights.

Any feedback and questions on this document should be directed to the users' national committee. A complete listing of these bodies can be found on the CENELEC website.

iTeh STANDARD PREVIEW
(standards.iteh.ai)

Endorsement notice

The text of the International Standard IEC 62044-3:2023 was approved by CENELEC as a European Standard without any modification.

SIST EN IEC 62044-3:2023
https://standards.iteh.ai/catalog/standards/sist/a0bdaf6b-6f48-4cda-b7c2-

In the official version, for Bibliography, the following notes have to be added for the standard indicated:

IEC 60051-1	NOTE Approved as EN 60051-1
IEC 60205	NOTE Approved as EN 60205
IEC 60401-3:2015	NOTE Approved as EN 60401-3:2016 (not modified)
IEC 60404-8-6	NOTE Approved as EN 60404-8-6
IEC 61332:2016	NOTE Approved as EN 61332:2017 (not modified)

SIST EN IEC 62044-3:2023

Annex ZA
(normative)

Normative references to international publications with their corresponding European publications

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.

NOTE 1 Where an International Publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

NOTE 2 Up-to-date information on the latest versions of the European Standards listed in this annex is available here: www.cencenelec.eu.

Publication	Year	Title	EN/HD	Year
IEC 62044-1	2002	Cores made of soft magnetic materials - Measuring methods - Part 1: Generic specification	EN 62044-1	2002

iTeh STANDARD PREVIEW
(standards.iteh.ai)
SIST EN IEC 62044-3:2023
https://standards.iteh.ai/catalog/standards/sist/a0bdaf6b-6f48-4cda-b7c2-ba1d77e153d4/sist-en-iec-62044-3-2023

SIST EN IEC 62044-3:2023

iTeh STANDARD PREVIEW
(standards.iteh.ai)

SIST EN IEC 62044-3:2023
https://standards.iteh.ai/catalog/standards/sist/a0bdaf6b-6f48-4cda-b7c2-ba1d77e153d4/sist-en-iec-62044-3-2023

SIST EN IEC 62044-3:2023

IEC 62044-3

Edition 2.0 2023-07

INTERNATIONAL STANDARD

NORME INTERNATIONALE

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

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

iTeh STANDARD PREVIEW
(standards.iteh.ai)
https://standards.iteh.ai/catalog/standards/sist/a0bdaf6b-6f48-4cda-b7c2-ba1d77e153d4/sist-en-iec-62044-3-2023

INTERNATIONAL ELECTROTECHNICAL COMMISSION

COMMISSION ELECTROTECHNIQUE INTERNATIONALE

ICS 29.030, 29.100.10

ISBN 978-2-8322-7172-8

Warning! Make sure that you obtained this publication from an authorized distributor.
Attention! Veuillez vous assurer que vous avez obtenu cette publication via un distributeur agréé.

® Registered trademark of the International Electrotechnical Commission
Marque déposée de la Commission Electrotechnique Internationale

SIST EN IEC 62044-3:2023

CONTENTS

iTeh STANDARD PREVIEW
(standards.iteh.ai)
SIST EN IEC 62044-3:2023
https://standards.iteh.ai/catalog/standards/sist/a0bdaf6b-6f48-4cda-87c2-ba1d77e133d4/sist-en-iec-62044-3-2023

SIST EN IEC 62044-3:2023

iTeh STANDARD PREVIEW
(standards.iteh.ai)
SIST EN IEC 62044-3:2023
https://standards.iteh.ai/catalog/standards/sist/...
SIST EN IEC 62044-3:2023

SIST EN IEC 62044-3:2023

iTeh STANDARD PREVIEW
(standards.iteh.ai)
SIST EN IEC 62044-3:2023
https://standards.iteh.ai/catalog/standards/sist/a0bdaf6b-6f48-4cda-b7c2-ba1d77e153d4/sist-en-iec-62044-3-2023

SIST EN IEC 62044-3:2023

INTERNATIONAL ELECTROTECHNICAL COMMISSION

_____

CORES MADE OF SOFT MAGNETIC MATERIALS – MEASURING METHODS –

Part 3: Magnetic properties at high excitation level

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) IEC draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). IEC takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, IEC had not received notice of (a) patent(s), which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at https://patents.iec.ch. IEC shall not be held responsible for identifying any or all such patent rights.

IEC 62044-3 has been prepared by IEC technical committee 51: Magnetic components, ferrite and magnetic powder materials. It is an International Standard.

This second edition cancels and replaces the first edition published in 2000. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

a) addition of Annex F and Annex G.

iTeh Standards (standards.iteh.ai) SIST EN IEC 62044-3:2023 https://standards.iteh.ai/catalog/standards/sist/a0bda10b0148-4cda-b7c2-ba1d77e153d4/sist-en-iec-62044-3-2023

SIST EN IEC 62044-3:2023

The text of this International Standard is based on the following documents:

Draft	Report on voting
51/1426/CDV	51/1439/RVC

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 International Standard 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.

A list of all parts in the IEC 62044 series, published under the general title *Cores made of soft magnetic materials – Measuring methods*, can be found on the IEC website.

The committee has 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.

iTeh STANDARD PREVIEW
(standards.iteh.ai)
SIST EN IEC 62044-3:2023
https://standards.iteh.ai/catalog/standards/sist/a0bdaf6b-6f48-4cda-b7c2-ba1d77e153d4/sist-en-iec-62044-3-2023

SIST EN IEC 62044-3:2023

INTRODUCTION

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

IEC 62044-1: Generic specification

IEC 62044-2: Magnetic properties at low excitation level

IEC 62044-3: Magnetic properties at high excitation level

iTeh STANDARD PREVIEW
(standards.iteh.ai)
SIST EN IEC 62044-3:2023
https://standards.iteh.ai/catalog/standards/sist/a0bdaf6b-6f48-4cda-b7c2-ba1d77e153d4/sist-en-iec-62044-3-2023

SIST EN IEC 62044-3:2023

CORES MADE OF SOFT MAGNETIC MATERIALS – MEASURING METHODS –

Part 3: Magnetic properties at high excitation level

1 Scope

This part of IEC 62044 specifies 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 document can cover the measurement of magnetic properties for frequencies ranging practically from direct current 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 document 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 magnetic flux density and field strength waveforms with only slightly degraded accuracy.

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

iTeh Standards
(standards.iteh.ai)
SIST EN IEC 62044-3:2023
https://standards.iteh.ai/catalog/standards/sist/a0bdaf6b-6f48-4cda-b7c2-ba1d77e153d4/sist-en-iec-62044-3-2023

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 62044-1:2002, *Cores made of soft magnetic materials – Measuring methods – Part 1: Generic specification*

3 Terms, definitions and symbols

3.1 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

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

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

SIST EN IEC 62044-3:2023

3.1.1
effective amplitude permeability
μ_{ea}
magnetic permeability obtained from the peak value of the effective magnetic flux density, $\hat{B}_e$, and the peak value of the effective magnetic field strength, $\hat{H}_e$, at the stated value of either, when the magnetic flux density and magnetic field vary periodically with time and with an average of zero, and the material is initially in a specified demagnetized state

3.1.2
maximum effective amplitude permeability
$\mu_{ea\ max}$
maximum value of the effective amplitude permeability when the amplitude of excitation ($\hat{B}_e$ or $\hat{H}_e$) is varied

3.1.3
excitation
either magnetic flux density or field strength for which the waveform and amplitude both remain within the specified tolerance

Note 1 to entry: When the magnetic flux density (field strength) mode of excitation is chosen, the resultant waveform of field strength (magnetic flux density) can be distorted with respect to the excitation waveform due to the non-linear behaviour of the magnetic material.

iTeh STANDARD PREVIEW
(standards.iteh.ai)

3.1.4
high excitation level
excitation at which the permeability depends on excitation amplitude (particularly at low frequencies) or at which the power loss results in a noticeable temperature rise (particularly at high frequencies), or both

SIST EN IEC 62044-3:2023
https://standards.iteh.ai/catalog/standards/sist/a0bdaf6b-6f48-4cda-b7c2-ba1d77e153d4/sist-en-iec-62044-3-2023

3.1.5
exciting winding
winding of measuring coil to which the exciting voltage is applied or through which the exciting current is flowing

3.1.6
voltage sensing winding
unloaded winding of a measuring coil across which the electromotive force induced by the excitation can be determined

3.1.7
measuring winding
winding, usually secondary, loaded or unloaded, which can be used for measurement apart from the exciting or voltage sensing winding, or both

3.1.8
power loss
power absorbed by the core

3.1.9
pulse excitation without biasing field
excitation in which a core is energized by a voltage pulse, from a remanent flux density to a higher value of flux density in the same direction, and in which the core recovers to the same remanent flux density

Note 1 to entry: The excursion in the B-H plane associated with such a pulse is shown in Figure 1.