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Test methods for electrical and magnetic properties of magnetic powder cores

Táto norma obsahuje anglickú verziu európskej normy.
This standard includes the English version of the European Standard.

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EUROPEAN STANDARD

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EN IEC 63300

August 2023

ICS 29.030; 29.100.10

English Version

Test methods for electrical and magnetic properties of magnetic powder cores (IEC 63300:2023)

Méthodes d'essai des propriétés électriques et magnétiques des noyaux en poudre magnétique (IEC 63300:2023)

Prüfverfahren für elektrische und magnetische Eigenschaften magnetischer Pulverkerne (IEC 63300:2023)

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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

Ref. No. EN IEC 63300:2023 E

European foreword

The text of document 51/1419/CDV, future edition 1 of IEC 63300, 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 63300:2023.

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)	2024-05-01
• latest date by which the national standards conflicting with the document have to be withdrawn	(dow)	2026-08-01

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

IEC 61007:2020	NOTE Approved as EN IEC 61007:2020 (not modified)
IEC 62044 (series)	NOTE Approved as EN 62044 (series)
IEC 62044-1	NOTE Approved as EN 62044-1
IEC 62044-2	NOTE Approved as EN 62044-2
IEC 62044-3	NOTE Approved as EN 62044-3

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 63182-2	-	Magnetic powder cores - Guidelines on dimensions and the limits of surface irregularities - Part 2: Ring-cores	EN IEC 63182-2	-

IEC 63300

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INTERNATIONAL STANDARD

NORME INTERNATIONALE

colour inside

Test methods for electrical and magnetic properties of magnetic powder cores

Méthodes d'essai des propriétés électriques et magnétiques des noyaux en poudre magnétique

IEC 63300:2023-06(en-fr)

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TEST METHODS FOR ELECTRICAL AND MAGNETIC PROPERTIES OF MAGNETIC POWDER CORES

FOREWORD

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IEC 63300 has been prepared by IEC technical committee 51: Magnetic components, ferrite and magnetic powder materials. It is an International Standard.

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

Draft	Report on voting
51/1419/CDV	51/1436/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/standardsdev/publications.

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.

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INTRODUCTION

Magnetic powder cores have the characteristics of low relative permeability, high saturated flux density and low loss. Therefore, compared with ungapped ferrite, the equivalent impedance of a sample of magnetic powder core is much smaller, and the magnetizing current is very large, so the required excitation source will have both high frequency and high-power capacity, which is difficult to obtain in practice. Moreover, the impedance angle of a magnetic powder core under test is very close to 90°, and this results in great difficulties to obtain accurate measurements of power loss.

The IEC 62044 series provides measuring methods of magnetic properties at low and high excitation levels for magnetic cores made of magnetic oxides or metallic powders. However, the methods introduced in the IEC 62044 series cannot fully meet the measurement requirements for magnetic properties of magnetic powder cores. It is therefore useful to have a standard for suitable measuring methods for the magnetic properties of magnetic powder cores.

New test methods with pulse wave excitation and DC power method that account for the characteristics of magnetic power cores are introduced in this document, in addition to some modifications for the traditional test methods. Also, an air core inductor with single winding or dual windings is introduced in the document to verify or calibrate the accuracy of test methods for magnetic properties of magnetic powder cores, because of the linear properties of an air core inductor.

TEST METHODS FOR ELECTRICAL AND MAGNETIC PROPERTIES OF MAGNETIC POWDER CORES

1 Scope

This document provides the test methods for the electrical and magnetic properties of magnetic powder cores used for inductive components in electronics equipment, switch-mode power supplies and power conversion equipment, and introduces measuring principles, scope of application and matters of importance for each method.

The parameters used to characterize the magnetic powder cores include: inductance factor, effective permeability, complex relative permeability, temperature coefficient of permeability, frequency coefficient of permeability, DC bias characteristic, power loss, and quality factor. This document is the basis for determining the characteristic parameters of magnetic powder cores.

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 63182-2, *Magnetic powder cores – Guidelines on dimensions and the limits of surface irregularities – Part 2: Ring-cores*