

Magnetic materials - Part 6: Methods of measurement of the magnetic properties of magnetically soft metallic and powder materials at frequencies in the range 20 Hz to 100 kHz by the use of ring specimens

EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

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English Version

Magnetic materials - Part 6: Methods of measurement of the magnetic properties of magnetically soft metallic and powder materials at frequencies in the range 20 Hz to 100 kHz by the use of ring specimens
(IEC 60404-6:2018)

Matériaux magnétiques - Partie 6: Méthodes de mesure des propriétés magnétiques des matériaux métalliques et des matériaux en poudre magnétiquement doux, aux fréquences comprises entre 20 Hz et 100 kHz, sur des éprouvettes en forme de tore
(IEC 60404-6:2018)

Magnetische Werkstoffe - Teil 6: Verfahren zur Messung der magnetischen Eigenschaften weichmagnetischer und pulverförmiger Werkstoffe bei Frequenzen im Bereich 20 Hz bis 100 kHz mit Hilfe von Ringproben
(IEC 60404-6:2018)

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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

European foreword

The text of document 68/595/FDIS, future edition 3 of IEC 60404-6, prepared by IEC/TC 68 "Magnetic alloys and steels" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN IEC 60404-6:2018.

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) 2019-03-29
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2021-06-29

This document supersedes EN 60404-6:2003.

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.

Endorsement notice

The text of the International Standard IEC 60404-6:2018 was approved by CENELEC as a European Standard without any modification.

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.cenelec.eu.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 60050-121	-	International Electrotechnical Vocabulary (IEV) - Part 121: Electromagnetism	-	-
IEC 60050-221	-	International Electrotechnical Vocabulary (IEV) - Chapter 221: Magnetic materials and components	-	-
IEC 60404-2	-	Magnetic materials - Part 2: Methods of measurement of the magnetic properties of electrical steel sheet and strip by means of an Epstein frame	EN 60404-2	-
IEC 60404-4	-	Magnetic materials - Part 4: Methods of measurement of d.c. magnetic properties of magnetically soft materials	EN 60404-4	-
IEC 60404-8-6	-	Magnetic materials - Part 8-6: Specifications for individual materials - Soft magnetic metallic materials	EN 60404-8-6	-
IEC 60404-8-9	-	Magnetic materials - Part 8: Specification for individual materials - Section 9: Standard specification for sintered soft magnetic materials	-	-
IEC 62044-3	-	Cores made of soft magnetic materials - Measuring methods - Part 3: Magnetic properties at high excitation level	EN 62044-3	-
ISO/IEC Guide 98-3-	-	Uncertainty of measurement - Part 3: Guide to the expression of uncertainty in measurement (GUM:1995)	-	-

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

MAGNETIC MATERIALS –**Part 6: Methods of measurement of the magnetic properties of magnetically soft metallic and powder materials at frequencies in the range 20 Hz to 100 kHz by the use of ring specimens**

FOREWORD

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International Standard IEC 60404-6 has been prepared by IEC technical committee 68: Magnetic alloys and steels.

This third edition cancels and replaces the second published in 2003. This edition constitutes a technical revision.

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

- a) adaption to modern measurement and evaluation methods, in particular the introduction of the widely spread digital sampling method for the acquisition and evaluation of the measured data;
- b) limitation of the frequency range up to 100 kHz;

- c) deletion of Clause 7 of the second edition that specified the measurement of magnetic properties using a digital impedance bridge;
- d) addition of a new Clause 7 on the measurement of the specific total loss by the wattmeter method, including an example of the application of the digital sampling method;
- e) addition of an informative annex on the technical details of the digital sampling technique for the determination of magnetic properties.

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

FDIS	Report on voting
68/595/FDIS	68/600/RVD

Full information on the voting for the approval of this International Standard can be found in the report on voting indicated in the above table.

This document has been drafted in accordance with the ISO/IEC Directives, Part 2.

A list of all parts in the IEC 60404 series, published under the general title *Magnetic materials*, 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 "<http://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.

MAGNETIC MATERIALS –

Part 6: Methods of measurement of the magnetic properties of magnetically soft metallic and powder materials at frequencies in the range 20 Hz to 100 kHz by the use of ring specimens

1 Scope

This part of IEC 60404 specifies methods for the measurement of AC magnetic properties of soft magnetic materials, other than electrical steels and soft ferrites, in the frequency range 20 Hz to 100 kHz. The materials covered by this part of IEC 60404 include those speciality alloys listed in IEC 60404-8-6, amorphous and nano-crystalline soft magnetic materials, pressed and sintered and metal injection moulded parts such as are listed in IEC 60404-8-9, cast parts and magnetically soft composite materials.

The object of this part is to define the general principles and the technical details of the measurement of the magnetic properties of magnetically soft materials by means of ring methods. For materials supplied in powder form, a ring test specimen is formed by the appropriate pressing method for that material.

The measurement of the DC magnetic properties of soft magnetic materials is made in accordance with the ring method of IEC 60404-4. The determinations of the magnetic characteristics of magnetically soft components are made in accordance with IEC 62044-3.

NOTE IEC 62044-3:2000 specifies methods for the measurement of AC magnetic characteristics of magnetically soft components in the frequency range up to 10 MHz.

Normally, the measurements are made at an ambient temperature of $(23 \pm 5) ^\circ\text{C}$ on test specimens which have first been magnetized, then demagnetized. Measurements can be made over other temperature ranges by agreement between parties concerned.

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 60050-121, *International Electrotechnical Vocabulary – Part 121: Electromagnetism*

IEC 60050-221, *International Electrotechnical Vocabulary – Chapter 221: Magnetic materials and components*

IEC 60404-2, *Magnetic materials – Part 2: Methods of measurement of the magnetic properties of electrical steel sheet and strip by means of an Epstein frame*

IEC 60404-4, *Magnetic materials – Part 4: Methods of measurement of d.c. magnetic properties of iron and steel*

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