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I.S. EN 60404-8-1:2015

# Magnetic materials - Part 8-1: Specifications for individual materials - Magnetically hard materials

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|---|---|
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NORME EUROPÉENNE

EUROPÄISCHE NORM

# EN 60404-8-1

May 2015

ICS 29.030; 17.220.20

English Version

# Magnetic materials - Part 8-1: Specifications for individual materials - Magnetically hard materials (IEC 60404-8-1:2015)

Matériaux magnétiques - Partie 8-1: Spécifications pour matériaux particuliers - Matériaux magnétiquement durs (IEC 60404-8-1:2015)

Magnetische Werkstoffe - Teil 8-1: Anforderungen an einzelne Werkstoffe - Hartmagnetische Werkstoffe (Dauermagnete) (IEC 60404-8-1:2015)

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## Foreword

The text of document 68/495/FDIS, future edition 3 of IEC 60404-8-1, prepared by IEC/TC 68 "Magnetic alloys and steels" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 60404-8-1:2015.

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) 2016-02-01
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# Annex ZA
(normative)

## Normative references to international publications with their corresponding European publications

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NOTE 1 When 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.

| Publication | Year | Title | EN/HD | Year |
|---|---|---|---|---|
| IEC 60050 | series | International electrotechnical vocabulary | - | - |
| IEC 60404-5 | - | Magnetic materials - Part 5: Permanent magnet (magnetically hard) materials - Methods of measurement of magnetic properties | - | - |

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# IEC 60404-8-1

Edition 3.0 2015-03

# INTERNATIONAL STANDARD

# NORME INTERNATIONALE

## Magnetic materials –
## Part 8-1: Specifications for individual materials – Magnetically hard materials

## Matériaux magnétiques –
## Partie 8-1: Spécifications pour matériaux particuliers – Matériaux magnétiquement durs

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# IEC 60404-8-1

Edition 3.0 2015-03

# INTERNATIONAL STANDARD

# NORME INTERNATIONALE

## Magnetic materials –
## Part 8-1: Specifications for individual materials – Magnetically hard materials

## Matériaux magnétiques –
## Partie 8-1: Spécifications pour matériaux particuliers – Matériaux magnétiquement durs

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ICS 17.220.20; 29.030

ISBN 978-2-8322-2429-8

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

# MAGNETIC MATERIALS –

## Part 8-1: Specifications for individual materials – Magnetically hard materials

## FOREWORD

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International Standard IEC 60404-8-1 has been prepared by IEC technical committee 68: Magnetic alloys and steels.

This third edition cancels and replaces the second edition published in 2001 and Amendment 1:2004. This edition constitutes a technical revision.

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

a) recently developed anisotropic Sm-Fe-N bonded magnets are included;

b) high energy ferrites with La and Co as substituents are included.

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

| FDIS | Report on voting |
|---|---|
| 68/495/FDIS | 68/503/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 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 publication will remain unchanged until the stability date indicated on the IEC web site under "http://webstore.iec.ch" in the data related to the specific publication. At this date, the publication will be

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# INTRODUCTION

This third edition of IEC 60404-8-1 includes the recently developed anisotropic Sm-Fe-N bonded magnets and high energy ferrites with La and Co as substituents which have become established in permanent magnet applications. It also includes corrections to the second edition in order to improve consistency with IEC 60404-5. The squareness of the demagnetization curve is introduced through the quantity $H_{\mathrm{D}}$ .

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# MAGNETIC MATERIALS –

## Part 8-1: Specifications for individual materials – Magnetically hard materials

## 1 Scope

This part of IEC 60404 specifies minimum values for the principal magnetic properties of, and dimensional tolerances for, technically important magnetically hard materials (permanent magnets).

For information purposes only, this part of IEC 60404 provides values for the densities of the materials and the ranges of their chemical compositions.

NOTE Some additional physical data and mechanical reference values concerning the magnetic materials are given in Table A.1 for information and comparison purposes.

## 2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60050 (all parts), *International Electrotechnical Vocabulary* (available at: www.electropedia.org)

IEC 60404-5, *Magnetic materials – Part 5: Permanent magnet (magnetically hard) materials – Methods of measurement of magnetic properties*

## 3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 60050-121 [1], IEC 60050-151 [2] and IEC 60050-221 [3] apply.[1]

## 4 Types of materials and their applications

Permanent magnetic materials, also designated as magnetically hard materials, are classified in IEC 60404-1 [4] as Class R (magnetically hard alloys), Class S (magnetically hard ceramics) and Class U (bonded magnets).

Permanent magnets have a coercivity relating to the magnetic polarization greater than 1 kA/m. After being magnetized to saturation they produce a material-dependent specific magnetic energy, which can be used in static or dynamic magnetic circuit applications.

Permanent magnetic materials are used in nearly every area of daily life. They perform coupling, modulating, or regulating functions in equipment and devices based on electromagnetic principles, for example in measuring instruments, motors, generators and

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[1] Numbers in square brackets refer to the Bibliography.

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