



BSI Standards Publication

Magnetic materials

Part 1: Classification

This is a preview of BS EN 60404-1:2017+A1:2025. [Click here to purchase the full version from the ANSI store.](#)

National foreword

This British Standard is the UK implementation of EN 60404-1:2017+A1:2025. It is identical to IEC 60404-1:2016, incorporating amendment 1:2025. It supersedes BS EN 60404-1:2017, which will be withdrawn on 30 September 2028.

The start and finish of text introduced or altered by amendment is indicated in the text by tags. Tags indicating changes to IEC text carry the number of the IEC amendment. For example, text altered by IEC amendment 1 is indicated by A1 A1.

The UK participation in its preparation was entrusted to Technical Committee ISE/108, Magnetic Alloys and Steels.

A list of organizations represented on this committee can be obtained on request to its committee manager.

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Published by BSI Standards Limited 2025

ISBN 978 0 539 26875 1

ICS 29.030

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This British Standard was published under the authority of the Standards Policy and Strategy Committee on 28 February 2017.

Amendments/corrigenda issued since publication

Date	Text affected
30 September 2025	Implementation of IEC amendment 1:2025 with CENELEC endorsement A1:2025

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EUROPÄISCHE NORM

September 2025

ICS 29.030

English Version

**Magnetic materials - Part 1: Classification
(IEC 60404-1:2016)**

Matériaux magnétiques - Partie 1: Classification
(IEC 60404-1:2016)

Magnetische Werkstoffe - Teil 1: Klassifizierung
(IEC 60404-1:2016)

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European Committee for Electrotechnical Standardization
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The text of document 68/533/CDV, future edition 3 of IEC 60404-1, prepared by IEC/TC 68 "Magnetic alloys and steels" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 60404-1:2017.

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) 2017-08-28
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2019-11-28

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European foreword to Amendment 1

The text of document 68/780/CDV, future edition 3 of IEC 60404-1/AMD1, prepared by TC 68 "Magnetic alloys and steels" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 60404-1:2017/A1:2025.

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) 2026-09-30
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(normative)

Normative references to international publications with their corresponding European publications

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.

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

<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 60050-151	-	International Electrotechnical Vocabulary (IEV) - Part 151: Electrical and magnetic devices	-	-
IEC 60050-221	-	International Electrotechnical Vocabulary (IEV) - Chapter 221: Magnetic materials and components	-	-
IEC 60401-3	-	Terms and nomenclature for cores made of magnetically soft ferrites - Part 3: Guidelines on the format of data appearing in manufacturers' catalogues of transformer and inductor cores	EN 60401-3	-
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 60404-3	-	Magnetic materials - Part 3: Methods of measurement of the magnetic properties of magnetic sheet and strip by means of a single sheet tester	-	-
IEC 60404-4	-	Magnetic materials - Part 4: Methods of measurement of d.c. magnetic properties of iron and steel	EN 60404-4	-
IEC 60404-6	-	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 200 kHz by the use of ring specimens	EN 60404-6	-
IEC 60404-7	-	Magnetic materials - Part 7: Method of measurement of the coercivity of magnetic materials in an open magnetic circuit	-	-

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IEC 60404-8-1	-	Magnetic materials - Part 8-1: Specifications for individual materials - Magnetically hard materials	EN 60404-8-1	-
IEC 60404-8-3	-	Magnetic materials - Part 8-3: Specifications for individual materials - Cold-rolled electrical non-alloyed and alloyed steel sheet and strip delivered in the semi-processed state	-	-
IEC 60404-8-4	-	Magnetic materials - Part 8-4: Specifications for individual materials - Cold-rolled non-oriented electrical steel strip and sheet delivered in the fully-processed state	-	-
IEC 60404-8-5	-	Magnetic materials - Part 8: Specifications for individual materials - Section 5: Specification for steel sheet and strip with specified mechanical properties and magnetic permeability	-	-
IEC 60404-8-6	-	Magnetic materials - Part 8-6: Specifications for individual materials - Soft magnetic metallic materials	EN 60404-8-6	-
IEC 60404-8-7	-	Magnetic materials - Part 8-7: Specifications for individual materials - Cold-rolled grain-oriented electrical steel strip and sheet delivered in the fully-processed state	-	-
IEC 60404-8-8	-	Magnetic materials - Part 8: Specifications for individual materials - Section 8: Specification for thin magnetic steel strip for use at medium frequencies	-	-
IEC 60404-8-9	-	Magnetic materials - Part 8: Specification for individual materials - Section 9: Standard specification for sintered soft magnetic materials	-	-
IEC 60404-8-10	-	Magnetic materials - Part 8-10: Specifications for individual materials - Magnetic materials (iron and steel) for use in relays	-	-
IEC 60404-8-11	-	Magnetic materials - Part 8-11: Specifications for individual materials - Fe-based amorphous strip delivered in the semi-processed state	EN IEC 60404-8-11	-
IEC 60404-10	-	Magnetic materials - Part 10: Methods of measurement of magnetic properties of electrical steel strip and sheet at medium frequencies	-	-
ISO 4948-1	-	Steels; Classification - Part 1: Classification of steels into unalloyed and alloy steels based on chemical composition	-	-

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FOREWORD	3
1 Scope	5
2 Normative references	5
3 Terms and definitions	6
4 Magnetically soft materials (coercivity ≤ 1 kA/m).....	7
4.1 Class A – Irons	7
4.1.1 Reference documents	7
4.1.2 Chemical composition	7
4.1.3 Basis of subclassification.....	7
4.1.4 Available forms.....	7
4.1.5 Physical characteristics	7
4.1.6 Main applications.....	7
4.2 Class B – Low carbon mild steels.....	8
4.2.1 Class B1 – Bulk material.....	8
4.2.2 Class B2 – Flat material	8
4.3 Class C – Silicon steels	9
4.3.1 Class C1 – Bulk material	9
4.3.2 Class C2 – Flat material	10
4.4 Class D – Other steels	15
4.4.1 Class D1 – Bulk material	15
4.4.2 Class D2 – Flat material	17
4.4.3 Class D3 – Stainless steels	17
4.5 Class E – Nickel-iron alloys	18
4.5.1 Class E1 – Nickel content 70 % to 85 %	18
4.5.2 Class E2 – Nickel content 54 % to 68 %	19
4.5.3 Class E3 – Nickel content 40 % to 51 %	20
4.5.4 Class E4 – Nickel content 35 % to 40 %	21
4.5.5 Class E5 – Nickel content 29 % to 33 %	22
4.6 Class F – Iron-cobalt alloys.....	23
4.6.1 Class F1 – Cobalt content 47 % to 50 %	23
4.6.2 Class F2 – Cobalt content 35 %.....	23
4.6.3 Class F3 – Cobalt content 23 % to 30 %	24
4.7 Class G – Other alloys	25
4.7.1 Class G1 – Aluminium-iron alloys	25
4.7.2 Class G2 – Aluminium-silicon-iron alloys	26
4.8 Class H – Magnetically soft materials made by powder metallurgical techniques	27
4.8.1 Class H1 – Soft ferrites.....	27
4.8.2 Class H2 – Magnetically soft sintered materials	28
4.8.3 Class H3 – Powder composites	29
4.9 Class I – Amorphous soft magnetic materials.....	29
4.9.1 General	29
4.9.2 Class I1 – Iron-based amorphous alloys	30
4.9.3 Class I2 – Cobalt-based amorphous alloys	31
4.9.4 Class I3 – Nickel-based amorphous alloys.....	32
4.10 Class J – Nano-crystalline soft magnetic materials.....	32
4.10.1 Reference document.....	32

This is a preview of BS EN 60404-1:2017+A1:2025. [Click here to purchase the full version from the ANSI store.](#)

4.10.3	Chemical composition.....	33
4.10.4	Basis of subclassification.....	33
4.10.5	Available forms.....	33
4.10.6	Physical characteristics	33
4.10.7	Main applications.....	33
5	Magnetically hard materials (coercivity > 1 kA/m)	34
5.1	Class Q – Magnetostrictive alloys – Rare earth iron alloys (Class Q1)	34
5.1.1	Reference document.....	34
5.1.2	Chemical composition.....	34
5.1.3	Basis of subclassification.....	34
5.1.4	Available forms.....	34
5.1.5	Physical characteristics	34
5.1.6	Main applications.....	34
5.2	Class R – Magnetically hard alloys.....	34
5.2.1	Class R1 – Aluminium-nickel-cobalt-iron-titanium (AlNiCo) alloys	34
5.2.2	Class R3 – Iron-cobalt-vanadium-chromium (FeCoVCr) alloys	35
5.2.3	Class R5 – Rare earth cobalt (RECo) alloys	36
5.2.4	Class R6 – Chromium-iron-cobalt (CrFeCo) alloys.....	37
5.2.5	Class R7 – Rare earth-iron-boron (REFeB) sintered magnets	38
5.2.6	Class R8 - Rare earth-iron-boron (REFeB) hot deformed magnets.....	39
5.3	Class S – Magnetically hard ceramics – Hard ferrites (Class S1)	40
5.3.1	Reference document.....	40
5.3.2	Chemical composition and manufacturing method	40
5.3.3	Basis of subclassification.....	40
5.3.4	Available forms.....	40
5.3.5	Physical characteristics	40
5.3.6	Main applications.....	40
5.4	Class T – Other magnetically hard materials – Martensitic steels (Class T1).....	40
5.4.1	Reference document.....	40
5.4.2	Composition	40
5.4.3	Basis of subclassification.....	41
5.4.4	Available forms.....	41
5.4.5	Physical characteristics	41
5.4.6	Main applications.....	41
5.5	Class U – Bonded magnetically hard materials	41
5.5.1	General	41
5.5.2	Class U1 – Bonded aluminium-nickel-cobalt-iron-titanium (AlNiCo) magnets	41
5.5.3	Class U2 – Bonded rare earth-cobalt (RECo) magnets	42
5.5.4	Class U3 – Bonded neodymium-iron-boron (REFeB) magnets	43
5.5.5	Class U4 – Bonded hard ferrite magnets.....	43
5.5.6	Class U5 – Bonded rare earth-iron-nitrogen magnets.....	44

MAGNETIC MATERIALS –

Part 1: Classification

FOREWORD

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

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

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

- a) Removal of all tables and values describing typical properties of the material to be consistent with the aim of the document to be a classification and not a specification.
- b) Enlargement of the Ni content for the classes E1 and E3.
- c) Enlargement of the Co content for the classes F3.
- d) Addition of a new class: U5 bonded rare earth-iron-nitrogen magnets.

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

CDV	Report on voting
68/533/CDV	68/555/RVC

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.

A bilingual version of this publication may be issued at a later date.

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1 Scope

This part of IEC 60404 is intended to classify commercially available magnetic materials.

The term "magnetic materials" denotes substances where the application requires the existence of ferromagnetic or ferrimagnetic properties.

In this document, the classification of magnetic materials is based upon the generally recognized existence of two main groups of products:

- soft magnetic materials (coercivity $\leq 1\ 000$ A/m);
- hard magnetic materials (coercivity $> 1\ 000$ A/m).

Within these main groups, the classification when appropriate recognizes the following characteristics:

- the main alloying element and the metallurgical state and physical properties of the material;
- when possible and convenient, the relationship between these characteristics is identified.

A classification by specific areas of application cannot be applied to all materials because different materials can very often be used for the same application depending on the characteristics required.

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 60050-151, *International Electrotechnical Vocabulary – Part 151: Electrical and magnetic devices*

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

IEC 60401-3, *Terms and nomenclature for cores made of magnetically soft ferrites – Part 3: Guidelines on the format of data appearing in manufacturers catalogues of transformer and inductor cores*

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 60404-3, *Magnetic materials – Part 3: Methods of measurement of the magnetic properties of magnetic sheet and strip by means of a single sheet tester*

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

IEC 60404-6, *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 200 kHz by the use of ring specimens*