

STN	Magnetické materiály Časť 8-6: Špecifikácie jednotlivých materiálov Magneticky mäkké kovové materiály	STN EN 60404-8-6 34 5884
------------	--	--

Magnetic materials - Part 8-6: Specifications for individual materials - Soft magnetic metallic materials

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

Táto norma bola oznámená vo Vestníku ÚNMS SR č. 08/17

Obsahuje: EN 60404-8-6:2017, IEC 60404-8-6:2016

Oznámením tejto normy sa od 21.04.2020 ruší
STN EN 60404-8-6 (34 5884) z mája 2009

125402

Úrad pre normalizáciu, metrológiu a skúšobníctvo Slovenskej republiky, 2017
Podľa zákona č. 264/1999 Z. z. o technických požiadavkách na výrobky a o posudzovaní zhody a o zmene a doplnení niektorých zákonov v znení neskorších predpisov sa slovenská technická norma a časti slovenskej technickej normy môžu rozmnožovať alebo rozširovať len so súhlasom slovenského národného normalizačného orgánu.

EUROPEAN STANDARD

EN 60404-8-6

NORME EUROPÉENNE

EUROPÄISCHE NORM

April 2017

ICS 29.030

Supersedes EN 60404-8-6:2009

English Version

**Magnetic materials - Part 8-6: Specifications for individual
materials - Soft magnetic metallic materials
(IEC 60404-8-6:2016)**

Matériaux magnétiques - Partie 8-6: Spécifications pour
matériaux particuliers - Matériaux métalliques
magnétiquement doux
(IEC 60404-8-6:2016)

Magnetische Werkstoffe - Teil 8-6: Anforderungen an
einzelne Werkstoffe - Weichmagnetische metallische
Werkstoffe
(IEC 60404-8-6:2016)

This European Standard was approved by CENELEC on 2017-01-12. 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.

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



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

CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

European foreword

The text of document 68/528/CDV, future edition 3 of IEC 60404-8-6, prepared by IEC/TC 68 "Magnetic alloys and steels" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 60404-8-6:2017.

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) 2017-10-21
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2020-04-21

This document supersedes EN 60404-8-6:2009.

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

Endorsement notice

The text of the International Standard IEC 60404-8-6:2016 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following note has to be added for the standard indicated:

ISO 286-1:2010

NOTE Harmonized as EN ISO 286-1:2010.

Annex ZA (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 60050-131	-	International Electrotechnical Vocabulary (IEV) - Part 131: Circuit theory	-	-
IEC 60050-221	-	International Electrotechnical Vocabulary (IEV) - Chapter 221: Magnetic materials and components	-	-
IEC 60404-1	-	Magnetic materials - Part 1: Classification	-	-
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 60404-6	-	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	-	-
IEC 60404-8-3	-	Magnetic materials - Part 8-3: Specifications of 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 60404-8-7	-	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 60404-8-10	-	Magnetic materials - Part 8-10: Specifications for individual materials - Magnetic materials (iron and steel) for use in relays	-	-

EN 60404-8-6:2017

IEC 60404-9	-	Magnetic materials - Part 9: Methods of determination of the geometrical characteristics of magnetic steel sheet and strip	-	-
IEC 60635	-	Toroidal strip-wound cores made of magnetically soft material	-	-
ISO 404	-	Steel and steel products - General technical delivery requirements	-	-
ISO 10474	-	Steel and steel products - Inspection documents	-	-



INTERNATIONAL STANDARD

NORME INTERNATIONALE

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

**Matériaux magnétiques –
Partie 8-6: Spécifications pour matériaux particuliers – Matériaux métalliques
magnétiquement doux**





THIS PUBLICATION IS COPYRIGHT PROTECTED

Copyright © 2016 IEC, Geneva, Switzerland

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either IEC or IEC's member National Committee in the country of the requester. If you have any questions about IEC copyright or have an enquiry about obtaining additional rights to this publication, please contact the address below or your local IEC member National Committee for further information.

Droits de reproduction réservés. Sauf indication contraire, aucune partie de cette publication ne peut être reproduite ni utilisée sous quelque forme que ce soit et par aucun procédé, électronique ou mécanique, y compris la photocopie et les microfilms, sans l'accord écrit de l'IEC ou du Comité national de l'IEC du pays du demandeur. Si vous avez des questions sur le copyright de l'IEC ou si vous désirez obtenir des droits supplémentaires sur cette publication, utilisez les coordonnées ci-après ou contactez le Comité national de l'IEC de votre pays de résidence.

IEC Central Office
3, rue de Varembe
CH-1211 Geneva 20
Switzerland

Tel.: +41 22 919 02 11
Fax: +41 22 919 03 00
info@iec.ch
www.iec.ch

About the IEC

The International Electrotechnical Commission (IEC) is the leading global organization that prepares and publishes International Standards for all electrical, electronic and related technologies.

About IEC publications

The technical content of IEC publications is kept under constant review by the IEC. Please make sure that you have the latest edition, a corrigenda or an amendment might have been published.

IEC Catalogue - webstore.iec.ch/catalogue

The stand-alone application for consulting the entire bibliographical information on IEC International Standards, Technical Specifications, Technical Reports and other documents. Available for PC, Mac OS, Android Tablets and iPad.

IEC publications search - www.iec.ch/searchpub

The advanced search enables to find IEC publications by a variety of criteria (reference number, text, technical committee,...). It also gives information on projects, replaced and withdrawn publications.

IEC Just Published - webstore.iec.ch/justpublished

Stay up to date on all new IEC publications. Just Published details all new publications released. Available online and also once a month by email.

Electropedia - www.electropedia.org

The world's leading online dictionary of electronic and electrical terms containing 20 000 terms and definitions in English and French, with equivalent terms in 15 additional languages. Also known as the International Electrotechnical Vocabulary (IEV) online.

IEC Glossary - std.iec.ch/glossary

65 000 electrotechnical terminology entries in English and French extracted from the Terms and Definitions clause of IEC publications issued since 2002. Some entries have been collected from earlier publications of IEC TC 37, 77, 86 and CISPR.

IEC Customer Service Centre - webstore.iec.ch/csc

If you wish to give us your feedback on this publication or need further assistance, please contact the Customer Service Centre: csc@iec.ch.

A propos de l'IEC

La Commission Electrotechnique Internationale (IEC) est la première organisation mondiale qui élabore et publie des Normes internationales pour tout ce qui a trait à l'électricité, à l'électronique et aux technologies apparentées.

A propos des publications IEC

Le contenu technique des publications IEC est constamment revu. Veuillez vous assurer que vous possédez l'édition la plus récente, un corrigendum ou amendement peut avoir été publié.

Catalogue IEC - webstore.iec.ch/catalogue

Application autonome pour consulter tous les renseignements bibliographiques sur les Normes internationales, Spécifications techniques, Rapports techniques et autres documents de l'IEC. Disponible pour PC, Mac OS, tablettes Android et iPad.

Recherche de publications IEC - www.iec.ch/searchpub

La recherche avancée permet de trouver des publications IEC en utilisant différents critères (numéro de référence, texte, comité d'études,...). Elle donne aussi des informations sur les projets et les publications remplacées ou retirées.

IEC Just Published - webstore.iec.ch/justpublished

Restez informé sur les nouvelles publications IEC. Just Published détaille les nouvelles publications parues. Disponible en ligne et aussi une fois par mois par email.

Electropedia - www.electropedia.org

Le premier dictionnaire en ligne de termes électroniques et électriques. Il contient 20 000 termes et définitions en anglais et en français, ainsi que les termes équivalents dans 15 langues additionnelles. Egalement appelé Vocabulaire Electrotechnique International (IEV) en ligne.

Glossaire IEC - std.iec.ch/glossary

65 000 entrées terminologiques électrotechniques, en anglais et en français, extraites des articles Termes et Définitions des publications IEC parues depuis 2002. Plus certaines entrées antérieures extraites des publications des CE 37, 77, 86 et CISPR de l'IEC.

Service Clients - webstore.iec.ch/csc

Si vous désirez nous donner des commentaires sur cette publication ou si vous avez des questions contactez-nous: csc@iec.ch.



INTERNATIONAL STANDARD

NORME INTERNATIONALE

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

**Matériaux magnétiques –
Partie 8-6: Spécifications pour matériaux particuliers – Matériaux métalliques
magnétiquement doux**

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

COMMISSION
ELECTROTECHNIQUE
INTERNATIONALE

ICS 29.030

ISBN 978-2-8322-3674-1

**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.**

CONTENTS

FOREWORD.....	4
1 Scope.....	6
2 Normative references	6
3 Terms, definitions and abbreviations	7
3.1 Terms and definitions.....	7
3.2 Abbreviations for test specimens	8
4 Classification.....	8
4.1 General.....	8
4.2 Alloy class A (irons).....	9
4.3 Alloy class C (silicon steels).....	9
4.4 Alloy class E (nickel-iron alloys).....	9
4.5 Alloy class F (cobalt-iron alloys)	9
5 Designation	9
6 General requirements	9
6.1 Chemical composition and production process.....	9
6.2 Delivery condition	10
6.2.1 General	10
6.2.2 Form of supply.....	10
6.2.3 Surface condition.....	10
7 Technical requirements	10
7.1 Magnetic properties	10
7.2 Geometric characteristics and tolerances.....	11
7.2.1 Flat products: sheet, plate and strip.....	11
7.2.2 Cold-worked bar, rod and wire	11
7.2.3 Hot-finished bar	11
8 Inspection and testing.....	11
8.1 General.....	11
8.2 Selection of samples.....	12
8.2.1 General	12
8.2.2 Flat products	12
8.2.3 Long products.....	12
8.2.4 Wire.....	12
8.3 Magnetic properties	12
8.3.1 Magnetic testing, DC measurements.....	12
8.3.2 Magnetic testing, AC measurements.....	12
8.3.3 Test specimens	12
8.4 Geometric characteristics and tolerances.....	12
8.4.1 Thickness of flat products	12
8.4.2 Width of flat products	12
8.4.3 Flatness	12
8.4.4 Edge camber	13
8.4.5 Dimensions of long products.....	13
8.4.6 Straightness of long products	13
8.5 Retests	13
9 Complaints	13
10 Ordering information.....	13

11 Certification	13
Bibliography.....	20
Table 1 – Chemical composition of the alloy classes in accordance with IEC 60404-1	14
Table 2 – Minimum amplitude permeability requirements for sheet and strip – AC measurement (50 Hz or 60 Hz), sine flux conditions, thickness 0,05 mm to 0,38 mm	15
Table 3 – DC magnetic property requirements for bar, billet, rod, sheet, strip and wire, thickness or diameter greater than 0,05 mm – S.R., L.R. or E.S. specimen.....	16
Table 4 – Maximum permeability rise factor for sheet and strip – L.R. test specimen, AC measurement (50 Hz or 60 Hz)	17
Table 5 – Dimensional requirements for toroidal strip-wound cores.....	17
Table 6 – Tolerances on thickness of cold-rolled sheet and strip.....	18
Table 7 – Tolerances on width of sheet and strip	18
Table 8 – Tolerances on dimensions of cold-worked bar, rod and wire.....	19

INTERNATIONAL ELECTROTECHNICAL COMMISSION

MAGNETIC MATERIALS –**Part 8-6: Specifications for individual materials –
Soft magnetic metallic materials**

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

International Standard IEC 60404-8-6 has been prepared by IEC technical committee 68: Magnetic alloys and steels.

This third edition cancels and replaces the second edition published in 1999 and Amendment 1:2007. This edition constitutes a technical revision.

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

Removal of Table 2b).

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

CDV	Report on voting
68/528/CDV	68/552/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 publication will remain unchanged until the stability date indicated on the IEC website under "<http://webstore.iec.ch>" in the data related to the specific publication. At this date, the publication will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

MAGNETIC MATERIALS –

Part 8-6: Specifications for individual materials – Soft magnetic metallic materials

1 Scope

This part of IEC 60404 specifies the general requirements, magnetic properties, geometric characteristics and tolerances as well as inspection procedures for pure iron, silicon-iron, nickel-iron and cobalt-iron. The materials are in the form of bar, billet, sheet, strip or wire. The alloys covered correspond to those defined by classes A, C1, C2, E1 to E4 and F1 to F3 in IEC 60404-1.

Magnetic materials used primarily for relays, iron and steel products, classified only by coercivity, are covered in IEC 60404-8-10. IEC 60404-8-10 is less restrictive in terms of magnetic properties than the irons (class A) and the silicon steels (classes C21 and C22) specified in this standard, but it gives more comprehensive dimensional tolerances.

Non-oriented and oriented silicon steels (C21 and C22) for industrial power frequency applications, classified by specific total loss, are covered in IEC 60404-8-3, IEC 60404-8-4 and IEC 60404-8-7.

Non-oriented and oriented thin magnetic materials for use at medium frequencies, classified by specific total loss, are covered in IEC 60404-8-8.

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 60050-131, *International Electrotechnical Vocabulary – Part 131: Circuit theory*

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

IEC 60404-1, *Magnetic materials – Part 1: Classification*

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 60404-6, *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*

IEC 60404-7, *Magnetic materials – Part 7: Method of measurement of the coercivity of magnetic materials in an open magnetic circuit*

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 60404-8-7, *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 60404-8-10, *Magnetic materials – Part 8-10: Specifications for individual materials – Magnetic materials (iron and steel) for use in relays*

IEC 60404-9, *Magnetic materials – Part 9: Methods of determination of the geometrical characteristics of magnetic steel sheet and strip*

IEC 60635, *Toroidal strip-wound cores made of magnetically soft material*

ISO 404, *Steel and steel products – General technical delivery requirements*

ISO 10474, *Steel and steel products – Inspection documents*

koniec náhľadu – text ďalej pokračuje v platenej verzii STN