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Magnetic materials -
Part 8-8: Specifications for individual materials - Thin electrical steel strip and sheet for use at medium frequencies

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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Magnetic materials - Part 8-8: Specifications for individual materials - Thin electrical steel strip and sheet for use at medium frequencies

FOREWORD

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This consolidated version of the official IEC Standard and its amendment has been prepared for user convenience.

IEC 60404-8-8 edition 2.1 contains the second edition (2017-09) [documents 68/546/CDV and 68/562/RVC] and its amendment 1 (2026-06) [documents 68/795/CDV and 68/803/RVC].

In this Redline version, a vertical line in the margin shows where the technical content is modified by amendment 1. Additions are in green text, deletions are in strikethrough red text. A separate Final version with all changes accepted is available in this publication.

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

This second edition cancels and replaces the first edition published in 1991.

This edition constitutes a technical revision.

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

– extension of the range of electrical steels to include the improved grades.

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

CDV	Report on voting
68/546/CDV	68/562/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 the parts in the IEC 60404 series, under the general title *Magnetic materials*, can be found on the IEC website.

The committee has decided that the contents of this document and its amendment 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– withdrawn, or

– revised.

1 Scope

This part of IEC 60404 defines the grades of thin non-oriented electrical steel strip and sheet in nominal thicknesses of 0,05 mm, 0,10 mm, 0,15 mm, 0,20 mm, 0,25 mm, 0,30 mm and 0,35 mm and of thin grain-oriented electrical steel strip and sheet in nominal thicknesses of 0,05 mm, 0,10 mm, 0,15 mm and 0,18 mm. In particular, it gives general requirements, magnetic properties, geometric characteristics and tolerances, technological characteristics, as well as inspection procedures.

NOTE For thin non-oriented electrical steel strip and sheet, other nominal thicknesses (i.e. 0,12 mm, 0,18 mm, 0,23 mm and 0,27 mm) can be agreed between the manufacturer and the purchaser.

This document applies to electrical steel strip and sheet supplied in the finally annealed condition in coils or sheets and intended for the construction of magnetic circuits predominantly used at frequencies in the range from 100 Hz to 10 kHz.

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* (available at http://www.electropedia.org/)

IEC 60050-221, *International Electrotechnical Vocabulary – Chapter 221: Magnetic materials and components* (available at http://www.electropedia.org/)

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

IEC 60404-10, *Magnetic materials – Part 10: Methods of measurement of magnetic properties of magnetic steel sheet and strip at medium frequencies*

IEC 60404-13, *Magnetic materials – Part 13: Methods of measurement of resistivity, density and stacking factor of electrical steel strip and sheet*

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

ISO 7799, *Metallic materials – Sheet and strip 3 mm thick or less – Reverse bend test*

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

3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 60050-121 and IEC 60050-221 and the following apply.

3.1
number of bends
number of alternate bends possible before the appearance of the first crack in the base metal visible to the naked eye

Note 1 to entry The number of bends constitutes an indication of the ductility of the product.

3.2
edge camber
greatest distance between a longitudinal edge of a length of strip or a sheet and the line joining the two extremities of the measured length of this edge

Note 1 to entry: See IEC 60404-9.

4 Classification

The grades covered by this document are classified according to the maximum value of the specific total loss in watts per kilogram and according to the nominal thickness of the product[1] (0,05 mm, 0,10 mm, 0,15 mm, 0,20 mm, 0,25 mm, 0,30 mm and 0,35 mm for non-oriented electrical steel; 0,05 mm, 0,10 mm, 0,15 mm and 0,18 mm for grain-oriented electrical steel).

5 Designation

The steel name comprises the following in the order given:

a) the characteristic letters:
   - NO for non-oriented electrical steel;
   - GO for grain-oriented electrical steel;

b) one hundred times the nominal thickness of the product, in millimetres;

c) the specified value of the maximum specific total loss at 1,0 T and the given frequency for non-oriented electrical steel grades.

EXAMPLE: NO 20-13: non-oriented strip or sheet in nominal thickness of 0,20 mm with a maximum specific total loss of 13 W/kg at 1,0 T and 400 Hz.

6 General requirements

6.1 Production process

The production process of the steel and its chemical composition are left to the discretion of the manufacturer.

6.2 Form of supply

The product is supplied in coils in the case of strip and in bundles in the case of sheets.

The mass of the coils or the bundles of sheets shall be agreed between the manufacturer and the purchaser at the time of enquiry and order.

The recommended value for the internal diameter of coils is 508 mm; however, another value (e.g. 400 mm) may be agreed for the internal diameter of coils between the manufacturer and the purchaser.

[1] In the rest of the document, the word “product” is used to mean “strip and sheet”.