

**BS 6404 :
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1995
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1994**

Magnetic materials

Part 8. Individual materials

**Section 8.10 Specification for magnetic
materials (iron and steel) for use in relays**

Committees responsible for this British Standard

The preparation of this British Standard was entrusted to Technical Committee ISE/NFE/5, Magnetic alloys and steels, upon which the following bodies were represented:

Association of Manufacturers Allied to the Electrical and
Electronic Industry (BEAMA)
British Steel Industry
Department of Trade and Industry (National Physical Laboratory)
Electricity Supply Industry in England and Wales
Electronic Components Industry Federation
GAMBICA (BEAMA Ltd.)
Institute of Physics
Rotating Electrical Machines Association (BEAMA Ltd.)
Sunderland Polytechnic (Magnet Centre)
Transmission and Distribution Association (BEAMA Ltd.)
Wolfson Centre for Magnetic Technology
Coopted members

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National foreword

This Part of BS 6404 has been prepared by Technical Committee ISE/NFE/5. It is identical with IEC 404-8-10 : 1994, *Magnetic materials Part 8 : Specifications for individual materials, Section 10 : Specification for magnetic materials (iron and steel) for use in relays*, published by the International Electrotechnical Commission (IEC).

This Part of BS 6404 is the eighth in a series of British Standards based on the IEC 404 series, *Magnetic materials*. The Part numbers of the British Standards follow those of the IEC publication. The following Parts of the British Standard have been published or will shortly be published.

Part 1	<i>Classification</i>
Part 2	<i>Methods of measurement of magnetic, electrical and physical properties of magnetic sheet and strip</i>
Part 3	<i>Methods of measurement of the magnetic properties of magnetic sheet and strip by means of a single sheet tester</i>
Part 4	<i>Methods of measurement of the d.c. magnetic properties of solid steels</i>
Part 5	<i>Methods of measurement of the magnetic properties of magnetically hard (permanent magnet) materials</i>
Part 6	<i>Methods of measurement of the magnetic properties of isotropic nickel-iron soft magnetic alloys, types E1, E3 and E4</i>
Part 7	<i>Method of measurement of the coercivity of the magnetic materials in an open magnetic circuit</i>
Part 8	<i>Individual materials</i>
Section 8.1	<i>Specification for magnetically hard materials</i>
Section 8.2	<i>Specification for cold-rolled, magnetic, non-oriented, alloyed steel strip delivered in the semi-processed state</i>
Section 8.3	<i>Specification for cold-rolled, magnetic, non-oriented, non-alloyed steel strip delivered in the semi-processed state</i>
Section 8.4	<i>Specification for cold-rolled, non-oriented, magnetic steel sheet and strip delivered in the finally annealed state</i>
Section 8.5	<i>Specification for steel and strip with specified mechanical properties and magnetic permeability</i>
Section 8.6	<i>Specification for soft magnetic metallic materials</i>
Section 8.7	<i>Specification for grain-oriented magnetic steel sheet and strip</i>
Section 8.8	<i>Specification for thin magnetic steel strip for use at medium frequencies</i>
Part 9	<i>Methods for determination of the geometric characteristics of magnetic steel sheet and strip</i>
Part 10	<i>Methods of measurement of magnetic properties of magnetic steel sheet and strip at medium frequencies</i>
Part 11	<i>Method of test for the determination of surface insulation resistance of magnetic sheet and strip</i>
Part 12	<i>Guide to the methods of assessment of temperature capability of interlaminar insulation coatings</i>

Additional Parts and Sections of IEC 404 will be published and are expected to provide a basis for additional Parts of BS 6404.

Cross-references

International standard	Corresponding British Standard
IEC 50(221) : 1990	BS 4727 <i>Glossary of electrotechnical, power, telecommunication, electronics, lighting and colour terms</i> Part 1 <i>Terms common to power, telecommunications and electronics</i> Group 07 : 1991 <i>Magnetic materials and components</i> (Identical)
IEC 404-1 : 1979	BS 6404 <i>Magnetic materials</i> Part 1 : 1984 <i>Classification</i> (Technically equivalent)
IEC 404-7 : 1982	Part 7 : 1986 <i>Method of measurement of the coercivity of magnetic materials in an open magnetic circuit</i> (Identical)
IEC 404-9 : 1987	Part 9 : 1987 <i>Methods for determination of the geometric characteristics of magnetic steel sheet and strip</i> (Identical)
ISO 286-1 : 1988	BS EN 20286 <i>ISO System of limits and fits</i> Part 1 : 1993 <i>Bases of tolerance deviations and fits</i>
ISO 404 : 1992	BS EN 10021 : 1993 <i>General technical delivery requirements for steel and iron products</i> (Technically equivalent)

The Technical Committee has reviewed the provisions of ISO 8457-1 : 1989 and ISO 10474 : 1991, to which normative reference is made in the text, and has decided that they are acceptable for use in conjunction with this standard.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

MAGNETIC MATERIALS –
Part 8: Specifications for individual materials –
Section 10: Specification for magnetic materials
(iron and steel) for use in relays

1 Scope

This International Standard specifies the general requirements, magnetic properties, geometric characteristics and tolerances as well as inspection procedures for magnetic materials used primarily for relays.

This standard applies to pure iron and steel products generally delivered in the semi-processed state.

These materials correspond to clauses A, B, C1 and C2 of IEC 404-1.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All normative documents are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

IEC 50(221): 1990, *International Electrotechnical Vocabulary (IEV) – Chapter 221: Magnetic materials and components*

IEC 404-1: 1979, *Magnetic materials – Part 1: Classification*

IEC 404-7: 1982, *Magnetic materials – Part 7: Method of measurement of the coercivity of magnetic materials in an open magnetic circuit*

IEC 404-9: 1987, *Magnetic materials – Part 9: Methods of determination of the geometrical characteristics of magnetic steel sheet and strip*

ISO 286-1: 1988, *ISO system of limits and fits – Part 1: Bases of tolerances, deviations and fits*

ISO 404: 1992, *Steel and steel products – General technical delivery requirements*

ISO 8457-1: 1989, *Steel wire rod – Part 1: Dimensions and tolerances*

ISO 10474: 1991, *Steel and steel products – Inspection documents*

3 Definitions

For the purpose of this International Standard, the definitions of the principal terms related to magnetic properties given in IEC 50(221) apply, as well as the following definitions:

3.1 sheet and plate: Flat rolled product with a minimum width of 600 mm. The edges may be as rolled, sheared or flame cut.

A distinction is made between sheets which have a thickness of less than 3 mm and plates which have a thickness of 3 mm or more.

3.2 strip: Flat rolled product which, immediately after the final rolling pass or after pickling or continuous annealing, is wound into a regular coil. As rolled, strip has slightly convex edges, but may also be supplied with sheared edges or slit from wider strip.

3.3 flats: Bars of rectangular cross-section, rolled on the four faces, whose thickness is generally 5 mm or greater and whose width is not greater than 150 mm.

3.4 rounds: Bars having a circular cross-section whose diameter is generally 8 mm or greater.

3.5 squares: Bars having a square cross-section whose side is generally 8 mm or greater.

3.6 wire rod: Hot rolled long product whose nominal size is generally 5 mm or greater and wound into irregular coils.

The cross-section may be round, oval, square, rectangular, hexagonal, octagonal, half-round or of any similar shape.

3.7 wire: Product of constant full cross-section along its length, obtained by cold drawing which can be wound into irregular or regular coils.

It is obtained by cold drawing wire rod through a reducing die or passing it under pressure between rollers and rewinding the drawn product.

3.8 edge camber: Edge camber is characterized by the greatest distance between a longitudinal edge of the sheet and the line joining the two extremities of the measured length of this edge.

4 Classification

The materials covered by this standard are classified according to the maximum value of coercivity, the shape and dimensions of the material and its final condition. Not all materials are available in the cold rolled condition throughout the thickness range.