

Magnetic materials — Permanent magnet (magnetically hard) materials — Methods of measurement of magnetic properties

The European Standard EN 10332:2003 has the status of a
British Standard

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National foreword

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The UK participation in its preparation was entrusted to Technical Committee ISE/NFE/5, Magnetic alloys and steels, which has the responsibility to:

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Foreword

This document (EN 10332:2003) has been prepared by Technical Committee ECISS/TC 24, "Electrical steel sheet and strip qualities - Qualities dimensions, tolerances and specific tests", the secretariat of which is held by DIN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by November 2003, and conflicting national standards shall be withdrawn at the latest by November 2003.

This document is equivalent to IEC 60404-5.

Annex A is normative.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Slovakia, Spain, Sweden, Switzerland and the United Kingdom.

1 Scope

This European standard specifies the method of measurement of the magnetic flux density, magnetic polarization and the magnetic field strength and also the determination of the demagnetization curve and recoil line of permanent magnet materials, such as those specified in IEC 60404-8-1, the properties of which are presumed homogeneous throughout their volume.

The performance of a magnetic system is not only dependent on the properties of the permanent magnet material but also on the dimensions of the system, the air-gap and other elements of the magnetic circuit. The methods described in this standard refer to the measurement on the magnetic properties in a closed magnetic circuit simulating a ring.

2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text, and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

IEC 60050-121:1998, *International Electrotechnical Vocabulary – Part 121: Electromagnetism*.

IEC 60050-151:2001, *International Electrotechnical Vocabulary – Part 151: Electrical and magnetic devices*.

IEC 60050-221:1990, *International Electrotechnical Vocabulary) – Chapter 221: Magnetic materials and components*.

3 Terms and definitions

For the purposes of this European Standard, the terms and definitions given in IEC 60050-121:1998, IEC 60050-151:2001 and IEC 60050-221:1990 apply.

For permanent magnet materials this standard deals with both the coercivity H_{CB} (the coercivity related to the magnetic flux density) and the intrinsic coercivity H_{CJ} (the coercivity related to the magnetic polarization).

The measurements specified in this standard are for both the magnetic flux density, B , and the magnetic polarization, J , as a function of the magnetic field strength, H . These quantities are related by the following equation :

$$B = \mu_0 H + J \quad (1)$$

where

B is the magnetic flux density, in teslas ;

μ_0 is the magnetic constant = $4\pi \cdot 10^{-7}$, in henry per metre ;

H is the magnetic field strength, in amperes per metre ;

J is the magnetic polarization, in teslas.

Using this relationship H_{CJ} values can be obtained from the $B(H)$ hysteresis loop and H_{CB} values can be obtained from the $J(H)$. The point at which the modulus of the product BH has a maximum value is called the working point for $(BH)_{\max}$ (see Figure 2).