



Standard Test Method for Direct Current Magnetic Properties of Low Coercivity Magnetic Materials Using Hysteresigraphs¹

This standard is issued under the fixed designation A773/A773M; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This test method provides dc hysteresigraph procedures (B - H loop methods) for the determination of basic magnetic properties of materials in the form of ring, spirally wound toroidal, link, double-lapped Epstein cores, or other standard shapes that may be cut, stamped, machined, or ground from cast, compacted, sintered, forged, or rolled materials. It includes tests for normal induction and hysteresis loop determination taken under conditions of continuous sweep magnetization. Rate of sweep may be varied, either manually or automatically at different portions of the curves during measurement.

1.2 The equipment and procedures described in this test method are most suited for soft and semi-hard materials with intrinsic coercivity less than about 100 Oersteds [8 kA/M]. Materials with higher intrinsic coercivities should be tested according to Test Method [A977/A977M](#).

1.3 The values and equations stated in customary (cgs-emu and inch-pound) or SI units are to be regarded separately as standard. Within this standard, SI units are shown in brackets. The values stated in each system may not be exact equivalents; therefore, each system shall be used independently of the other. Combining values from the two systems may result in nonconformance with this standard.

1.4 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 ASTM Standards:²

¹ This test method is under the jurisdiction of ASTM Committee A06 on Magnetic Properties and is the direct responsibility of Subcommittee A06.01 on Test Methods.

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² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

[A34/A34M Practice for Sampling and Procurement Testing of Magnetic Materials](#)

[A340 Terminology of Symbols and Definitions Relating to Magnetic Testing](#)

[A341/A341M Test Method for Direct Current Magnetic Properties of Materials Using D-C Permeameters and the Ballistic Test Methods](#)

[A343/A343M Test Method for Alternating-Current Magnetic Properties of Materials at Power Frequencies Using Wattmeter-Ammeter-Voltmeter Method and 25-cm Epstein Test Frame](#)

[A596/A596M Test Method for Direct-Current Magnetic Properties of Materials Using the Ballistic Method and Ring Specimens](#)

[A977/A977M Test Method for Magnetic Properties of High-Coercivity Permanent Magnet Materials Using Hysteresigraphs](#)

[E691 Practice for Conducting an Interlaboratory Study to Determine the Precision of a Test Method](#)

2.2 Other:

[IEC Publication 60404-4 Ed 2.2 – Part 4: Methods of Measurement of d.c. Magnetic Properties of Magnetically Soft Materials \(2008\)](#)³

3. Terminology

3.1 *Definitions*—The terms and symbols used in this test method are defined in Terminology [A340](#).

4. Summary of Test Method

4.1 A specimen is wound with a magnetizing winding (the primary winding) and a search winding (the secondary winding) for measuring the change in flux. When a magnetizing current, I , is applied to the primary winding, a magnetic field, H , is produced in the coil. This in turn produces magnetic flux ϕ in the specimen and the changing flux induces a voltage in the secondary winding which is integrated with respect to time using a fluxmeter. In specimens with uniform cross-sectional area that do not contain air gaps, such as rings, all of the

³ Available from American National Standards Institute, 25 W. 43rd St., 4th Floor, New York, NY 10036.