



Standard Test Method for Alternating-Current Magnetic Properties of Amorphous Materials at Power Frequencies Using Wattmeter-Ammeter- Voltmeter Method with Toroidal Specimens¹

This standard is issued under the fixed designation A912/A912M; 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 covers tests for various magnetic properties of amorphous materials at power frequencies [25 to 400 Hz] using a toroidal test transformer. The term “toroidal test transformer” is used to describe the test device, reserving the term “specimen” to refer to the material used in the test. The test specimen consists of toroidally wound flat strip.

1.2 This test method covers the determination of core loss, exciting power, rms and peak exciting current, several types of ac permeability, and related properties under ac magnetization at moderate and high inductions at power frequencies [25 to 70 Hz].

1.3 With proper instrumentation and specimen preparation, this test method is acceptable for measurements at frequencies from 5 Hz to 100 kHz. Proper instrumentation implies that all test instruments have the required frequency bandwidth. Also see [Annex A2](#).

1.4 This test method also provides procedures for calculating impedance permeability from measured values of rms exciting current and for calculating ac peak permeability from measured peak values of total exciting current at magnetic field strengths up to about 10 Oe [796 A/m].

1.5 Explanations of symbols and brief definitions appear in the text of this test method. The official symbols and definitions are listed in Terminology [A340](#).

1.6 This test method shall be used in conjunction with Practice [A34/A34M](#).

1.7 The values and equations stated in customary (cgs-emu and inch-pound) units 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.

1.8 *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

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

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

[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](#)

[A901 Specification for Amorphous Magnetic Core Alloys, Semi-Processed Types](#)

[C693 Test Method for Density of Glass by Buoyancy](#)

3. Significance and Use

3.1 This test method provides a satisfactory means of determining various ac magnetic properties of amorphous magnetic materials.

3.2 The procedures described herein are suitable for use by producers and users of magnetic materials for materials specification acceptance and manufacturing control.

3.3 The procedures described herein may be adapted for use with specimens of other alloys and other toroidal forms.

4. Interferences

4.1 Test methods using toroidal test transformers are especially useful for evaluating the magnetic properties of a

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.