



Standard Test Method for Alternating-Current Magnetic Properties of Toroidal Core Specimens Using the Voltmeter-Ammeter-Wattmeter Method¹

This standard is issued under the fixed designation A927/A927M; 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 the determination of several ac magnetic properties of either laminated ring or toroidal tape wound cores made from flat rolled product.

1.2 This test method covers test equipment and procedures for determination of specific core loss, specific exciting power, and peak permeability for power and audio frequencies (50 to 20 000 Hz) under sinusoidal flux conditions.

1.3 This test method, because of the use of a feedback-controlled power amplifier, is well suited for determination of ac magnetic properties at magnetic flux densities above the knee of the magnetization curve and is particularly useful for testing of high-saturation iron-cobalt alloys (for example, alloys listed in Specification A801), although use of this test method is not restricted to a particular type of material.

1.4 This test method shall be used in conjunction with Practice A34/A34M and Terminology A340.

1.5 The values stated in either SI units or inch-pound units are to be regarded separately as standard. 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 non-conformance with the standard.

1.6 *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

A697/A697M Test Method for Alternating Current Magnetic Properties of Laminated Core Specimen Using Voltmeter-Ammeter-Wattmeter Methods

A801 Specification for Wrought Iron-Cobalt High Magnetic Saturation Alloys (UNS R30005 and K92650)

3. Significance and Use

3.1 This test method is a derivative of Test Method A697/A697M specifically designed for testing of toroidal cores which are not covered in Test Method A697/A697M and for testing at magnetic flux densities above the knee of the magnetization curve.

3.2 Specimen size typically ranges from 1 to 1.25 in. [25.4 to 31.8 mm] in inside diameter to 1.5 in. [38.1 mm] in outside diameter with weights ranging from 30 to 60 g. Provided the test equipment is suitably chosen, there is no obvious limit to the overall size of core that can be tested. If basic material properties are desired, then the requirements of 5.1 must be observed.

3.3 The reproducibility and repeatability of this test method are such that this test method is suitable for design, specification acceptance, service evaluation, and research and development.

3.4 When testing under sinusoidal flux conditions at magnetic flux densities approaching saturation, highly peaked magnetizing waveforms will be present, and the test instruments used must have crest factor capabilities of at least 3; otherwise erroneous results will be obtained.

¹ This test method is under the jurisdiction of ASTM Committee A06 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.