



Designation: A 804/A804M – 99

Standard Test Methods for Alternating-Current Magnetic Properties of Materials at Power Frequencies Using Sheet-Type Test Specimens¹

This standard is issued under the fixed designation A 804/A804M; 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 These test methods cover the determination of specific core loss and peak permeability of single layers of sheet-type specimens tested with normal excitation at a frequency of 50 or 60 Hz.

NOTE 1—These test methods have been applied only at the commercial power frequencies, 50 and 60 Hz, but with proper instrumentation and application of the principles of testing and calibration embodied in the test methods, they are believed to be adaptable to testing at frequencies ranging from 25 to 400 Hz.

1.2 These test methods use calibration procedures that provide correlation with the 25-cm [250-mm] Epstein test.

1.3 The range of test inductions is governed by the properties of the test specimen and by the available instruments and other equipment components. Normally, nonoriented electrical steels can be tested over a range from 8 to 16 kG [0.8 to 1.6 T] for core loss. For oriented electrical steels, the normal range extends to 18 kG [1.8 T]. Maximum inductions in peak permeability testing are limited principally by heating of the magnetizing winding and tests are limited normally to a maximum ac magnetizing force of about 150 Oe [12 000 A/m].

1.4 These test methods cover two alternative procedures as follows:

Test Method 1—Sections 6-12

Test Method 2—Sections 13-19

1.4.1 Test Method 1 uses a test fixture having (1) two windings that encircle the test specimen, and (2) a ferromagnetic yoke structure that serves as the flux return path and has low core loss and low magnetic reluctance.

1.4.2 Test Method 2 uses a test fixture having (1) two windings that encircle the test specimen, (2) a third winding located inside the other two windings and immediately adjacent to one surface of the test specimen, and (3) a ferromagnetic yoke structure which serves as the flux-return path and has low magnetic reluctance.

1.5 *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.

1.6 The values stated in either customary (cgs-emu and inch-pound) units or SI units are to be regarded separately as standard. Within the text, the SI units are shown in brackets except for the sections concerning calculations where there are separate sections for the respective unit systems. The values stated in each system are not exact equivalents; therefore, each system shall be used independently of the other. Combining values from the systems may result in nonconformance with the specification.

2. Referenced Documents

2.1 ASTM Standards:

A 34/A 34M Practice for Sampling and Procurement Testing of Magnetic Materials²

A 340 Terminology of Symbols and Definitions Relating to Magnetic Testing²

A 343 Test Method for Alternating-Current Magnetic Properties of Materials at Power Frequencies Using Wattmeter-Ammeter-Voltmeter Method and 25-cm Epstein Test Frame²

A 677 Specification for Nonoriented Electrical Steel Fully Processed Types²

A 677M Specification for Nonoriented Electrical Steel, Fully Processed Types (Metric)²

A 683 Specification for Nonoriented Electrical Steel, Semi-processed Types²

A 683M Specification for Nonoriented Electrical Steel, Semiprocessed Types [Metric]²

A 876/A 876M Specification for Flat-Rolled, Grain-Oriented, Silicon-Iron Electrical Steel, Fully Processed Types²

3. Terminology

3.1 Definitions:

3.1.1 *General*—The definitions of terms, symbols, and conversion factors relating to magnetic testing found in Definitions A 340 are used in these methods.

3.2 Definitions of Terms Specific to This Standard:

¹ These methods are under the jurisdiction of ASTM Committee A-6 on Magnetic Properties and are the direct responsibility of Subcommittee A06.01 on Test Methods.

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² Annual Book of ASTM Standards, Vol 03.04.