



Standard Test Method for Magnetic Shield Efficiency in Attenuating Alternating Magnetic Fields¹

This standard is issued under the fixed designation A698/A698M; 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 means for determining the performance quality of a magnetic shield when placed in a magnetic field of alternating polarity.

1.2 This test method provides a means of evaluating and grading magnetic shielding materials to determine their suitability for use in the production of magnetic shields.

1.3 This test method shall be used in conjunction with and shall conform to the requirements of Practice A34/A34M.

1.4 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.

1.5 *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.*

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

3. Terminology

3.1 The following symbols and abbreviated definitions apply only to this test method (the official symbols and definitions are listed in Terminology A340):

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.

3.2 Definitions of Terms Specific to This Standard:

3.2.1 *attenuation ratio*—the ratio of the measured voltage in the pickup coil before and after the insertion of the shield under test, E_1/E_2 .

3.3 Abbreviations:

3.3.1 A —ac ammeter (usually root mean square (rms) but may be peak reading type).

3.3.2 E_I —voltage in the pickup coil, after establishing the field of test but before insertion of the shield into the test position.

3.3.3 E_2 —highest voltage observed in the pickup coil, at the field of test, while rotating the test shield in the test position.

3.3.4 H_p —magnetic field strength, Oe [A/m].

3.3.5 I_p —ac magnetizing current, peak amperes.

3.3.6 I —ac magnetizing current, rms amperes.

3.3.7 l_c —length of demagnetizing air coil, cm [m].

3.3.8 N —number of turns per coil section (one half of total Helmholtz coil turns).

3.3.9 N_I —number of turns in demagnetizing coil.

3.3.10 R —mean radius of Helmholtz coil, cm [m].

3.3.11 V —electronic voltmeter (average volts $\times \pi/2 \sqrt{2}$).

4. Summary of Test Method

4.1 *Frequency*—Tests under this test method are normally conducted at a test frequency of 60 Hz.

NOTE 1—Other test frequencies are used by mutual agreement. In general, as test frequencies are increased, it will be necessary to make corresponding changes in pickup or test coils and in the size of the power supply.

4.2 *Magnetic Field Strength*—Tests may be conducted at any desired magnetic field strength. The standard test level for ac magnetic fields is 0.5 or 2.0 peak Oe [39.8 or 159 peak A/m] and in the presence of the earth's magnetic field (see 9.2).

4.3 *Instrumentation*—The instruments described are for use at 60 Hz. At higher frequencies, electronic voltmeters and preamplifiers should also be satisfactory. It may be necessary to change the rms ammeter and power supplies for use at higher test frequencies. It may also be desirable to reduce the number of area turns in the pickup coil at these frequencies.