Designation: A1009 – 05

Standard Specification for Soft Magnetic MnZn Ferrite Core Materials for High Frequency (10 kHz-1 MHz) Power Transformer and Filter Inductor Applications[1]

This standard is issued under the fixed designation A1009; 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 specification covers the requirements to which the specified grades of soft magnetic manganese zinc (MnZn) ferrite materials shall conform. Cores made from these materials are used primarily in power transformers and filter inductors.

1.2 The values stated in customary (cgs-emu and inch-pounds) units are to be regarded as standard. The values given in parentheses are mathematical conversions to SI units, which are provided for information only and are not considered standard.

2. Referenced Documents

2.1 *ASTM Standards:*[2]

A340 Terminology of Symbols and Definitions Relating to Magnetic Testing

A1013 Test Method for High-Frequency (10 kHz-1 MHz) Core Loss of Soft Magnetic Core Components at Controlled Temperatures Using the Voltmeter-Ammeter-Wattmeter Method

3. Terminology

3.1 The terms and symbols used in this specification are defined in Terminology A340.

3.2 *Definitions of Terms Specific to This Standard*:

3.2.1 *Inductance Index (AL value)*—the self inductance per winding turn squared (L/N^2) expressed in units of nanohenries per turns squared (nH/N^2).

where:

n = nano = 10^{-9},
nH = inductance in nanohenries, and
N = number of turns on winding (example: 0.005 H with a 100 turn coil = $0.005/(100)^2$ H/N^2 = 500 nH/N^2).

3.2.2 *Mated Core Set*—Two or more core segments assembled with the magnetic flux path perpendicular to the mating surface.

3.2.3 Air core inductance, L_{air}, is the inductance of a core with the same magnetic path length and cross-sectional core area but with the relative permeability of air.

3.2.3.1 *Customary Units*

$$L_{air} = 4\Pi AN^2 10^{-9}/l_1, \text{ H}$$

where:

N = number of turns on winding;
A = cross-sectional area of core specimen, cm^2; and
l_1 = effective magnetic path length, cm.

3.2.3.2 *SI Units*

$$L_{air} = 4\Pi AN^2 10^{-7}/l_1, \text{ H}$$

where:

N = number of turns on winding;
A = cross-sectional area of core specimen, m^2; and
l_1 = effective magnetic path length, m.

4. Classification

4.1 The soft magnetic MnZn ferrite material-type designations for power transformer and filter inductor materials covered by this specification are listed in Table 1, Table 2, and Table X1.1. The prefix of the type designations identifies each material's intended use. Power transformer materials are denoted with the prefix P and filter materials are denoted with the prefix F.

4.2 The first and second digits of the type designations for a power transformer material identify the typical core loss density of the material in mW/cm^3, and the remainder of the type designation identifies the temperatures in °C in which the core material must not exceed the maximum core loss density.

[1] This specification is under the jurisdiction of ASTM Committee A06 on Magnetic Properties and is the direct responsibility of Subcommittee A06.02 on Material Specifications.

Current edition approved Nov. 1, 2005. Published December 2005. Originally approved in 2000. Last previous edition approved in 2000 as A1009 – 00. DOI: 10.1520/A1009-05.

[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.