



Designation: A 1009 – 00

Standard Specification for Soft Magnetic MnZn Ferrite Core Materials for High Frequency (10 kHz-1 MHz) Power Transformer and Filter Inductor Applications¹

This standard is issued under the fixed designation A 1009; 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 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:

A 340 Terminology of Symbols and Definitions Relating to Magnetic Testing²

3. Terminology

3.1 The terms and symbols used in this specification are defined in Terminology A 340.

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 = $0.005/(100)^2 \text{ H}/N^2 = 500 \text{ nH}/N^2$).

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

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

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

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

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 ASTM 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 last two digits identify the temperature of the minimum core loss in $^{\circ}\text{C}$.

4.3 The last four digits of the type designations for filter materials identify the typical relative inductance permeability.

5. Ordering Information

5.1 Orders for material under this specification shall include such of the following information as is required to describe the material adequately.

5.1.1 ASTM specification number including year of issue or revision.

5.1.2 ASTM soft magnetic MnZn ferrite material-type designation.

5.1.3 Core shape, size, dimensions, and dimensional tolerances.

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.

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² *Annual Book of ASTM Standards*, Vol 03.04.