Designation: A 904 – 98

Standard Specification for 50 Nickel-50 Iron Powder Metallurgy (P/M) Soft Magnetic Parts[1]

This standard is issued under the fixed designation A 904; 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 magnetic properties of 50 nickel-50 iron parts fabricated by powder metallurgy techniques and is intended for parts that require high magnetic permeability, high electrical resistivity, low coercive field strength, and low hysteresis loss. It differs from the wrought alloy specification (see Specification A 753) because these parts are porous. A number of magnetic properties such as permeability are proportional to the sintered density.

1.2 This specification deals with P/M parts in the sintered or annealed condition. Should the sintered parts be subjected to any secondary operation that causes mechanical strain, such as machining or sizing, they should be resintered or annealed.

1.3 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. The values stated in each system are not exact equivalents; therefore, each system shall be used independently of the other. Combining values from the two systems may result in nonconformance with this specification.

2. Referenced Documents

2.1 *ASTM Standards:*

A 34/A 34M Practice for Sampling and Procurement Testing of Magnetic Materials[2]

A 340 Terminology of Symbols and Definitions Relating to Magnetic Testing[2]

A 596/A 596M Test Method for Direct-Current Magnetic Properties of Materials Using the Ballistic Method and Ring Specimens[2]

A 753 Specification for Nickel-Iron Soft Magnetic Alloys[2]

A 773/A 773M Test Method for Magnetic Properties of Materials Using Ring and Permeameter Procedures with Electronic Hysteresigraphs[2]

B 328 Test Method for Density, Oil Content and Interconnected Porosity of Sintered Powder Metal Structural Parts and Oil-Impregnated Bearings[3]

E 1019 Test Methods for Determination of Carbon, Sulfur, Nitrogen, and Oxygen in Steel and in Iron, Nickel and Cobalt Alloys[4]

3. Terminology

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

4. Ordering Information

4.1 Orders for parts conforming to this specification shall include the following information.

4.1.1 Reference to this standard and year of issue/revision.

4.1.2 Reference to an applicable part drawing.

4.1.3 Quantity required.

4.1.4 A critical cross section of the part shall be defined and so indicated on the applicable part drawing. The location of the critical section is by mutual agreement between the purchaser and producer (see 6.2).

4.1.5 Magnetic property requirements if they are other than stated in 7.5.

4.1.6 Certification of chemical analysis or magnetic property evaluation, or both (Sections 5 and 7).

4.1.7 Marking and packaging requirements (Section 12).

4.1.8 Exceptions to this specification or special requirements such as functional testing as mutually agreed upon by the producer and purchaser.

5. Chemical Composition

5.1 The chemical composition of the parts shall conform to the requirements prescribed in Table 1.

5.2 Determination of metallic constituents shall be by a method acceptable to both producer and purchaser. Analysis of

[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.

[3] *Annual Book of ASTM Standards,* Vol 02.05.

[4] *Annual Book of ASTM Standards,* Vol 03.06.