



Standard Specification for Metal Injection Molding (MIM), Ferrous Structural Parts¹

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1. Scope

1.1 This specification covers ferrous metal injection molded materials fabricated by mixing elemental or prealloyed metal powders with binders, injecting into a mold, debinding, and sintering, with or without subsequent heat treatment.

1.2 This specification covers the following injection molded materials.

1.2.1 Compositions:

1.2.1.1 MIM-2200 Low-alloy steel produced from admixtures of iron powder and other alloying elements such as nickel and molybdenum.

1.2.1.2 MIM-2700 Low-alloy steel produced from admixtures of iron powder, and other alloying elements such as nickel and molybdenum.

1.2.1.3 MIM-4605 Low-alloy steel produced from admixtures of iron powder and other alloying elements such as nickel, molybdenum, and carbon.

1.2.1.4 MIM-316L Austenitic stainless steel produced from prealloyed powder or an admixture of powders.

1.2.1.5 MIM-17-4 PH Precipitation hardening stainless steel produced from prealloyed powder or an admixture of powders.

NOTE 1—Compositional limits and impurity elements may be different from AISI limits. Chemical composition limits are specified in 6.1 and Table 1.

1.3 Property values stated in English system units are the standard. Conversions to SI units may be approximate.

2. Referenced Documents

2.1 ASTM Standards:

B 243 Terminology of Powder Metallurgy²

B 311 Test Method for Density Determination for Powder Metallurgy (P/M) Materials Containing Less than Two Percent Porosity²

B 328 Test Method for Density, Oil Content and Interconnected Porosity of Sintered Metal Structural Parts and Oil Impregnated Bearings²

E 8 Test Methods for Tension Testing of Metallic Materials³

E 18 Test Methods for Rockwell Hardness and Rockwell Superficial Hardness of Metallic Materials³

E 350 Test Method for Chemical Analysis of Carbon Steel, Low-Alloy Steel, Silicon Electrical Steel, Ingot Iron, and Wrought Iron⁴

E 415 Test Method for Optical Emission Vacuum Spectrometric Analysis of Carbon and Low-Alloy Steel⁵

E 1019 Test Methods for Determination of Carbon, Sulfur, Nitrogen, Oxygen, and Hydrogen in Steel and in Iron, Nickel, and Cobalt Alloys⁵

E 1479 Practice for Describing and Specifying Induction Coupled Plasma Optical Emission Spectrometers⁵

2.2 Other Test Methods and Standards:

MPIF Standard 35, Material Standards for Metal Injection Molded Parts⁶

MPIF Standard 50, Method for Preparing and Evaluating Metal Injection Molded Debound and Sintered Tension Test Specimens⁶

MPIF Standard 51, Determination of Microhardness of Powder Metallurgy Materials⁶

3. Terminology

3.1 Definitions:

3.1.1 Definitions of powder metallurgy terms can be found in Terminology B 243. Additional descriptive information is available in the Related Material Section of Vol. 02.05 of the Annual Book of ASTM Standards.

4. Ordering Information

4.1 Orders for parts conforming to this specification may include the following:

4.1.1 ASTM Designation,

4.1.2 Alloy composition including carbon content (see 6.1 and Table 1),

4.1.3 Heat Treatment condition and hardness (see Tables 2-5),

4.1.4 Functional or mechanical property testing (see 7.1.1-7.1.3, 8.2, Tables 2-5),

4.1.5 Purchaser or purchaser's representative desire to witness the inspection and testing of material prior to shipment (see 9.2),

4.1.6 Requirement for certification of material and a report of test results (see 11.1),

¹ This specification is under the jurisdiction of ASTM Committee B-9 on Metal Powders and Metal Powder Products and is the direct responsibility of Subcommittee B09.11 on Near Full Density Powder Metallurgy Metals.

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² Annual Book of ASTM Standards, Vol 02.05.

³ Annual Book of ASTM Standards, Vol 03.01.

⁴ Annual Book of ASTM Standards, Vol 03.05.

⁵ Annual Book of ASTM Standards, Vol 03.06.

⁶ Available from Metal Powder Industries Federation, 105 College Road East, Princeton, NJ 08540-6692.