



Standard Specification for Powder Metallurgy (P/M) Boron Stainless Steel Structural Components¹

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1. Scope

1.1 This specification covers stainless steel powder metallurgy (P/M) structural components with a 7.7-g/cm³ minimum density, which are fabricated from prealloyed powder consisting primarily of iron, chromium, nickel, molybdenum, and boron² and are intended for use in corrosive service.

1.2 The values stated in inch-pound units are to be regarded as the standard. The SI values given in parentheses are for information only.

2. Referenced Documents

2.1 ASTM Standards:

A 262 Practices for Detecting Susceptibility to Intergranular Attack in Austenitic Stainless Steels³

B 117 Practice for Operating Salt Spray (Fog) Apparatus⁴

B 243 Terminology of Powder Metallurgy⁵

B 311 Test Method for Density Determination for Powder Metallurgy (P/M) Materials Containing Less than Two Percent Porosity⁵

E 8 Test Methods for Tension Testing of Metallic Materials⁶

E 354 Test Methods for Chemical Analysis of High-Temperature, Electrical, Magnetic, and Other Similar Iron, Nickel, and Cobalt Alloys⁷

E 572 Test Method for X-Ray Emission Spectrometric Analysis of Stainless Steel⁸

E 1019 Test Methods for Determination of Carbon, Sulfur, Nitrogen, and Oxygen in Steel and in Iron, Nickel, and Cobalt Alloys⁸

E 1086 Test Method for Optical Emission Vacuum Spectrometric Analysis of Stainless Steel by the Point-to-Plane Excitation Technique⁸

G 48 Test Method for Pitting and Crevice Corrosion Resistance of Stainless Steels and Related Alloys by Use of

Ferric Chloride Solution⁴

3. Terminology

3.1 *Definitions*—Definitions of powder metallurgy terms can be found in Terminology B 243. Additional descriptive information is in the Related Material section of Volume 02.05 of the *Annual Book of ASTM Standards*.

4. Ordering Information

4.1 Orders for components under this specification shall include the following information:

4.1.1 Dimensions (see Section 9),

4.1.2 Chemical composition (see Section 6 and Table 1),

4.1.3 Density (see Section 7),

4.1.4 Mechanical properties (see Section 8 and Table 2),

4.1.5 Certification (see Section 13),

4.1.6 Reference to the standard.

5. Materials and Manufacture

5.1 Structural components shall be made by cold pressing and sintering prealloyed powder.

5.2 The sintering temperature is dependent on the chemical composition of the powder.

6. Chemical Composition

6.1 The material shall conform to the composition limits specified in Table 1.

6.2 Chemical analysis should be made in accordance with Test Methods E 354, E 572, E 1019, and E 1086.

7. Physical Properties

7.1 *Density*:

7.1.1 The sintered density shall be 7.7-g/cm³ minimum.

7.1.2 Density shall be determined in accordance with Test Method B 311.

8. Mechanical Properties

8.1 The purchaser and manufacturer shall agree upon the method to be used to verify the typical yield or tensile strength in the finished parts. The preferred method for verifying the tensile or yield strength is for the manufacturer and purchaser to agree upon a qualification test to be performed on the actual part. The specific test should be determined after consideration of the function of the part. An example would be measuring the

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² U.S. Patents 3980444, 4014680, 4032336.

³ *Annual Book of ASTM Standards*, Vol 01.03.

⁴ *Annual Book of ASTM Standards*, Vol 03.02.

⁵ *Annual Book of ASTM Standards*, Vol 02.05.

⁶ *Annual Book of ASTM Standards*, Vol 03.01.

⁷ *Annual Book of ASTM Standards*, Vol 03.05.

⁸ *Annual Book of ASTM Standards*, Vol 03.06.