



Standard Specification for Powder Forged (PF) Ferrous Materials¹

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1. Scope*

1.1 This specification covers powder forged ferrous materials fabricated by hot densification of atomized prealloyed or iron powders and intended for use as structural parts.

1.2 This specification covers powder forged parts made from the following materials:

1.2.1 Compositions:

1.2.1.1 PF-10XX Carbon Steel (produced from atomized iron powder and graphite powder),

1.2.1.2 PF-10CXX Copper-Carbon Steel (produced from atomized iron powder, copper and graphite powders),

1.2.1.3 PF-11XX Carbon Steel with manganese sulfide for enhanced machinability (produced from atomized iron powder, manganese sulfide, and graphite powders),

1.2.1.4 PF-11CXX, PF-1130CXX, and PF-1135CXX Copper-Carbon Steels with manganese sulfide for enhanced machinability (produced from atomized iron powder, copper, manganese sulfide, and graphite powders),

1.2.1.5 PF-42XX Nickel-Molybdenum Steel (produced from prealloyed atomized iron-nickel-molybdenum powder and graphite powder),

1.2.1.6 PF-46XX Nickel-Molybdenum Steel (produced from prealloyed atomized iron-nickel-molybdenum powder and graphite powder),

1.2.1.7 PF-44XX Molybdenum Steel (produced from prealloyed atomized iron-molybdenum powder and graphite powder), and

1.2.1.8 PF-49XX Molybdenum Steel (produced from prealloyed atomized iron-molybdenum powder and graphite powder).

NOTE 1—Alloy composition designations are modifications of the AISI-SAE nomenclature. For example: 10CXX designates a plain carbon steel containing copper and XX amount of carbon. Compositional limits of alloy and impurity elements may be different from the AISI-SAE limits. Chemical composition limits are specified in Section 6.

NOTE 2—XX designates the forged carbon content, in hundredths of a percent, that is specified by the purchaser for the application. For a given specified carbon content, the permissible limits shall be as specified in 6.2.

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

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NOTE 3—The old acronym for powder forging P/F has been replaced by PF throughout the document. The change in the prefix for the material designations is just to match the currently approved acronym for powder forging. No change has been made to the material specification and performance characteristics for the various powder forged materials.

1.2.2 Grades:

1.2.2.1 Grade A—Density equivalent to a maximum of 0.5 % porosity. The minimum density of those sections of the powder forged part so designated by the applicable part drawing shall not be less than the value specified in Table 1.

1.2.2.2 Grade B—Density equivalent to a maximum of 1.5 % porosity. The minimum density of those sections of the powder forged part so designated by the applicable part drawing shall not be less than the value specified in Table 1.

1.3 The values stated in either SI units or inch-pound units are to be regarded separately as standard. The values stated in each system may not be exact equivalents; therefore, each system shall be used independently of the other. Combining values from the two systems may result in non-conformance with the standard.

2. Referenced Documents

2.1 ASTM Standards:²

A255 Test Methods for Determining Hardenability of Steel

B243 Terminology of Powder Metallurgy

B311 Test Method for Density of Powder Metallurgy (PM) Materials Containing Less Than Two Percent Porosity

B795 Test Method for Determining the Percentage of Alloyed or Unalloyed Iron Contamination Present in Powder Forged (PF) Steel Materials

B796 Test Method for Nonmetallic Inclusion Content of Ferrous Powders Intended for Powder Forging (PF) Applications

B797 Test Method for Surface Finger-Oxide Penetration Depth and Presence of Interparticle Oxide Networks in Powder Forged (PF) Steel Parts

B934 Test Method for Effective Case Depth of Ferrous Powder Metallurgy (PM) Parts Using Microindentation Hardness Measurements

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.

*A Summary of Changes section appears at the end of this standard