



Standard Specification for Additive Manufacturing Stainless Steel Alloy (UNS S31603) with Powder Bed Fusion¹

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1. Scope

1.1 This specification covers additive manufacturing of UNS S31603 components by means of laser and electron beam-based full melt powder bed fusion processes. The components produced by these processes are used typically in applications that require mechanical properties similar to machined forgings and wrought products. Components manufactured to this specification are often, but not necessarily, post processed via machining, grinding, electrical discharge machining (EDM), polishing, and so forth to achieve desired surface finish and critical dimensions.

1.2 This specification is intended for the use of purchasers or producers, or both, of additively manufactured UNS S31603 components for defining the requirements and ensuring component properties.

1.3 Users are advised to use this specification as a basis for obtaining components that will meet the minimum acceptance requirements established and revised by consensus of the members of the committee.

1.4 User requirements considered more stringent may be met by the addition to the purchase order of one or more supplementary requirements, which may include, but are not limited to, those listed in Supplementary Requirements S1–S16.

1.5 The compositional requirements specified in this specification do not meet the compositional requirements for surgical implant grade UNS S31673.

1.6 The values stated in SI units are to be regarded as the standard. Other units are included only for informational purposes.

1.7 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

¹ This test method is under the jurisdiction of ASTM Committee F42 on Additive Manufacturing Technologies and is the direct responsibility of Subcommittee F42.05 on Materials and Processes.

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2. Referenced Documents

2.1 ASTM Standards:²

- A262 Practices for Detecting Susceptibility to Intergranular Attack in Austenitic Stainless Steels
- A276/A276M Specification for Stainless Steel Bars and Shapes
- A479/A479M Specification for Stainless Steel Bars and Shapes for Use in Boilers and Other Pressure Vessels
- A484/A484M Specification for General Requirements for Stainless Steel Bars, Billets, and Forgings
- A751 Test Methods, Practices, and Terminology for Chemical Analysis of Steel Products
- A1080 Practice for Hot Isostatic Pressing of Steel, Stainless Steel, and Related Alloy Castings
- B213 Test Methods for Flow Rate of Metal Powders Using the Hall Flowmeter Funnel
- B214 Test Method for Sieve Analysis of Metal Powders
- B243 Terminology of Powder Metallurgy
- B311 Test Method for Density of Powder Metallurgy (PM) Materials Containing Less Than Two Percent Porosity
- B769 Test Method for Shear Testing of Aluminum Alloys
- B855 Test Method for Volumetric Flow Rate of Metal Powders Using the Arnold Meter and Hall Flowmeter Funnel
- B964 Test Methods for Flow Rate of Metal Powders Using the Carney Funnel
- D3951 Practice for Commercial Packaging
- E3 Guide for Preparation of Metallographic Specimens
- E8/E8M Test Methods for Tension Testing of Metallic Materials
- E9 Test Methods of Compression Testing of Metallic Materials at Room Temperature
- E10 Test Method for Brinell Hardness of Metallic Materials
- E11 Specification for Woven Wire Test Sieve Cloth and Test Sieves
- E18 Test Methods for Rockwell Hardness of Metallic Materials

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.