



Standard Specification for Wrought Titanium-6 Aluminum-7 Niobium Alloy for Surgical Implant Applications [UNS R56700]¹

This standard is issued under the fixed designation F 1295; 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 chemical, mechanical, and metallurgical requirements for wrought annealed titanium-6 aluminum-7 niobium alloy bar to be used in the manufacture of surgical implants (1-4).²

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

2. Referenced Documents

2.1 ASTM Standards:

E 8 Test Methods for Tension Testing of Metallic Materials³

E 120 Test Methods for Chemical Analysis of Titanium and Titanium Alloys⁴

E 1409 Test Method for Determination of Oxygen in Titanium and Titanium Alloys by the Insert Gas Fusion Technique⁴

E 1447 Test Method for Determination of Hydrogen in Titanium and Titanium Alloys by the Insert Gas Fusion Thermal Conductivity Method⁵

F 981 Practice for Assessment of Compatibility of Biomaterials for Surgical Implants with Respect to Effect of Materials in Muscle and Bone⁶

2.2 Aerospace Material Specification:

AMS 2249 Chemical Check Analysis Limits, Titanium and Titanium Alloys⁷

2.3 ASQC Standard:

C1 Specification of General Requirements for a Quality Program⁸

3. Ordering Information

3.1 Inquiries and orders for material under this specification shall include the following information:

3.1.1 Quantity (weight or number of pieces),

3.1.2 ASTM designation,

3.1.3 Dimensions,

3.1.4 Condition,

3.1.5 Finish, and

3.1.6 Special requirements.

4. Materials and Manufacture

4.1 The titanium alloy shall be manufactured from multiple vacuum melted material using conventional reactive metal processing methods. The bar product covered in this specification is normally formed with the conventional forging and rolling equipment found in ferrous and nonferrous plants.

4.2 *Finish*—Annealed bar may be furnished to the implant manufacturer as descaled or pickled, sandblasted, ground, or combinations of these operations.

5. Chemical Composition

5.1 The heat analysis shall conform to the chemical composition of Table 1. Ingot analysis may be used for reporting all chemical requirements, except hydrogen. Samples for hydrogen shall be taken from the finished mill product.

5.1.1 Requirements for the major and minor elemental constituents are listed in Table 1. Also listed are important residual elements. Analysis for elements not listed in Table 1 is not required to certify compliance with this specification.

5.2 Product Analysis:

5.2.1 Product analysis tolerances do not broaden the specified heat analysis requirements but cover variations between laboratories in the measurement of chemical content. The manufacturer shall not ship material that is outside the limits specified in Table 1. Product analysis limits shall be as specified in Table 2.

5.2.2 The product analysis is either for the purpose of verifying the composition of a heat or lot or to determine variations in the composition within the heat.

5.3 For referee purposes, Test Methods E 120, E 1409, and E 1447 shall be used or other analytical methods agreed upon between purchaser and supplier shall be used.

5.4 Samples for chemical analysis shall be representative of

¹ This specification is under the jurisdiction of ASTM Committee F-4 on Medical and Surgical Materials and Devices and is the direct responsibility of Subcommittee F04.12 on Metallurgical Materials.

Current edition approved June 10, 1997. Published September 1997. Originally published as F 1295 – 92. Last previous edition F 1295 – 97.

² The boldface numbers in parentheses refer to a list of references at the end of the text.

³ *Annual Book of ASTM Standards*, Vols 01.02, 02.01, 02.02, 02.03, and 03.01.

⁴ *Annual Book of ASTM Standards*, Vol 03.05.

⁵ *Annual Book of ASTM Standards*, Vol 03.06.

⁶ *Annual Book of ASTM Standards*, Vol 13.01.

⁷ Available from Society of Automotive Engineers, 400 Commonwealth Drive, Warrendale, PA 15096.

⁸ Available from American Society for Quality Control, 161 West Wisconsin Ave., Milwaukee, WI 53203.