Designation: B363 – 06a

StandardSpecification for Seamless and Welded Unalloyed Titanium and Titanium Alloy Welding Fittings[1]

This standard is issued under the fixed designation B363; 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.

This standard has been approved for use by agencies of the Department of Defense.

1. Scope

1.1 This specification[2] covers fittings intended for general corrosion-resisting and elevated-temperature services, factory made from unalloyed titanium and titanium alloys. The term welding fittings applies to butt-welding parts such as 45° and 90° elbows, 180° returns, caps, tees, reducers, lap-joint stub ends, and other types.

1.2 *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.*

2. Referenced Documents

2.1 *ASTM Standards:*[3]

B265 Specification for Titanium and Titanium Alloy Strip, Sheet, and Plate

B338 Specification for Seamless and Welded Titanium and Titanium Alloy Tubes for Condensers and Heat Exchangers

B348 Specification for Titanium and Titanium Alloy Bars and Billets

B367 Specification for Titanium and Titanium Alloy Castings

B381 Specification for Titanium and Titanium Alloy Forgings

B600 Guide for Descaling and Cleaning Titanium and Titanium Alloy Surfaces

B861 Specification for Titanium and Titanium Alloy Seamless Pipe

B862 Specification for Titanium and Titanium Alloy Welded Pipe

2.2 *ANSI Standards:*[4]

B16.9 Wrought Steel Butt-Welding Fittings

B36.19 Stainless Steel Pipe

2.3 *Manufacturers' Standardization Society of the Valve and Fittings Industry Standards:*[5]

SP-25 Standard Marking System for Valves, Fittings, Flanges and Unions

SP-43 Standard Practice for Light Weight Stainless Steel Butt-Welding Fittings

2.4 *ASME Standard:*[6]

ASME Boiler and Pressure Vessel Code, Sections VIII and IX

3. Ordering Information

3.1 Orders for material to this specification shall include the following information as required:

3.1.1 Quantity,

3.1.2 Grade number,

3.1.3 Pipe size and schedule,

3.1.4 Method of manufacture and finish,

3.1.5 Restrictive chemistry, if desired,

3.1.6 Nondestructive tests,

3.1.7 Packaging, and

3.1.8 Inspection and required reports.

4. Material

4.1 The titanium for welding fittings may consist of billets, bars, plates, seamless or welded pipe or tube that conforms to all the requirements for manufacturing process, testing, chemical composition, and mechanical properties prescribed in Specifications B861 and B862 for the particular grades referred to in Table 1.

[1] This specification is under the jurisdiction of ASTM Committee B10 on Reactive and Refractory Metals and Alloysand is the direct responsibility of Subcommittee B10.01 on Titanium.

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[2] For ASME Boiler and Pressure Vessel Code applications, see related Specification SB-363 in Section II of that Code.

[3] 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.

[4] Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036, http://www.ansi.org.

[5] Available from Manufacturers Standardization Society of the Valve and Fittings Industry (MSS), 127 Park St., NE, Vienna, VA 22180-4602, http://www.mss-hq.com.

[6] Available from American Society of Mechanical Engineers (ASME), ASME International Headquarters, Three Park Ave., New York, NY 10016-5990, http://www.asme.org.

TABLE 1 Permissible Raw Materials

Grade[A]	Product and ASTM Designation					
	Pipe	Tube	Plate	Bar and Billet	Casting	Forging
WPT1	B861/B862 Grade 1	B338 Grade 1	B265 Grade 1	B348 Grade 1	B367 Grade C1	B381 Grade F-1
WPT2	B861/B862 Grade 2	B338 Grade 2	B265 Grade 2	B348 Grade 2	B367 Grade C2	B381 Grade F-2
WPT2H	B861/B862 Grade 2H	B338 Grade 2H	B265 Grade 2H	B348 Grade 2H	B367 Grade C2	B381 Grade F-2H
WPT3	B861/B862 Grade 3	B338 Grade 3	B265 Grade 3	B348 Grade 3	B367 Grade C3	B381 Grade F-3
WPT7	B861/B862 Grade 7	B338 Grade 7	B265 Grade 7	B348 Grade 7	B367 Grade C7	B381 Grade F-7
WPT7H	B861/B862 Grade 7H	B338 Grade 7H	B265 Grade 7H	B348 Grade 7H	B367 Grade C7	B381 Grade F-7H
WPT9	B861/B862 Grade 9	B338 Grade 9	B265 Grade 9	B348 Grade 9	...	B381 Grade F-9
WPT11	B861/B862 Grade 11	B338 Grade 11	B265 Grade 11	B348 Grade 11	B367 Grade C11	B381 Grade F-11
WPT12	B861/B862 Grade 12	B338 Grade 12	B265 Grade 12	B348 Grade 12	...	B381 Grade F-12
WPT13	B861/B862 Grade 13	B338 Grade 13	B265 Grade 13	B348 Grade 13	...	B381 Grade F-13
WPT14	B861/B862 Grade 14	B338 Grade 14	B265 Grade 14	B348 Grade 14	...	B381 Grade F-14
WPT15	B861/B862 Grade 15	B338 Grade 15	B265 Grade 15	B348 Grade 15	...	B381 Grade F-15
WPT16	B861/B862 Grade 16	B338 Grade 16	B265 Grade 16	B348 Grade 16	...	B381 Grade F-16
WPT16H	B861/B862 Grade 16H	B338 Grade 16H	B265 Grade 16H	B348 Grade 16H	...	B381 Grade F-16H
WPT17	B861/B862 Grade 17	B338 Grade 17	B265 Grade 17	B348 Grade 17	...	B381 Grade F-17
WPT18	B861/B862 Grade 18	B338 Grade 18	B265 Grade 18	B348 Grade 18	...	B381 Grade F-18
WPT19	B861/B862 Grade 19	...	B265 Grade 19	B348 Grade 19	...	B381 Grade F-19
WPT20	B861/B862 Grade 20	...	B265 Grade 20	B348 Grade 20	...	B381 Grade F-20
WPT21	B861/B862 Grade 21	...	B265 Grade 21	B348 Grade 21	...	B381 Grade F-21
WPT23	B861/B862 Grade 23	...	B265 Grade 23	B348 Grade 23	...	B381 Grade F-23
WPT24	B861/B862 Grade 24	...	B265 Grade 24	B348 Grade 24	...	B381 Grade F-24
WPT25	B861/B862 Grade 25	...	B265 Grade 25	B348 Grade 25	...	B381 Grade F-25
WPT26	B861/B862 Grade 26	B338 Grade 26	B265 Grade 26	B348 Grade 26	...	B381 Grade F-26
WPT26H	B861/B862 Grade 26H	B338 Grade 26H	B265 Grade 26H	B348 Grade 26H	...	B381 Grade F-26H
WPT27	B861/B862 Grade 27	B338 Grade 27	B265 Grade 27	B348 Grade 27	...	B381 Grade F-27
WPT28	B861/B862 Grade 28	B338 Grade 28	B265 Grade 28	B348 Grade 28	...	B381 Grade F-28
WPT33	B861/B862 Grade 33	B338 Grade 33	B265 Grade 33	B348 Grade 33	...	B381 Grade F-33
WPT34	B861/B862 Grade 34	B338 Grade 34	B265 Grade 34	B348 Grade 34	...	B381 Grade F-34
WPT35	B861/B862 Grade 35	B338 Grade 35	B265 Grade 35	B348 Grade 35	...	B381 Grade F-35
WPT36	B861/B862 Grade 36	B338 Grade 36	B265 Grade 36	B348 Grade 36	...	B381 Grade F-36
WPT37	B861/B862 Grade 37	B338 Grade 37	B265 Grade 37	B348 Grade 37	...	B381 Grade F-37
WPT38	B861/B862 Grade 38	B338 Grade 38	B265 Grade 38	B348 Grade 38	...	B381 Grade F-38

[A] When fittings are of welded construction, the symbol shown shall be supplemented by the letter "W."

5. Manufacture

5.1 Forging, forming, or shaping operations may be performed by hammering, pressing, piercing, extruding, upsetting, rolling, bending, fusion welding, or by a combination of two or more of these operations. The forming procedure shall be so applied that it will not produce injurious defects in the fittings.

5.2 Fittings containing welded seams or other joints made by fusion welding shall comply with the following provision:

5.2.1 Welded by welders, welding operators, and welding procedures qualified under the provisions of Section IX of the ASME Boiler and Pressure Vessel Code.

NOTE 1—Annealing of the unalloyed and alloyed grades of titanium covered by this specification is for the purpose of assuring uniform properties.

6. Chemical Composition

6.1 The titanium shall conform to the requirements as to chemical composition prescribed in the specifications referred to in Table 1.

6.2 The chemical analysis of the components of the fittings need not be reported unless required by agreement between the manufacturer and the purchaser and so specified on the order.

7. Product Analysis

7.1 Product analysis may be made by the purchaser from one or more fittings in each lot.

NOTE 2—Definition of the term "lot" shall be as agreed upon between the manufacturer and the purchaser.

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

8. Tensile Properties

8.1 The titanium shall conform to the requirements as to tensile properties prescribed in the specifications referred to in Table 1.

8.2 Tensile tests of the finished fittings need not be reported unless required by agreement between the manufacturer and the purchaser and so stated in the order.

9. Workmanship, Finish, and Appearance

9.1 For fittings covered by ANSI B16.9 or SP-43, or for fittings to be used with pipe ordered to ANSI B36.19, the sizes, shapes, and dimensions of the fittings shall be as specified in those standards.

9.2 The fittings shall have a workmanlike finish and shall be free of injurious external and internal imperfections of a nature that will interfere with the purpose for which the fittings are intended. Minor defects may be removed by grinding, providing the wall thickness is not decreased to less than the