



**Designation: B363-03a Designation: B 363 – 06a**

## Standard Specification for Seamless and Welded Unalloyed Titanium and Titanium Alloy Welding Fittings<sup>1</sup>

This standard is issued under the fixed designation B 363; 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 ( $\epsilon$ ) 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<sup>2</sup> 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:<sup>3</sup>

- B 265 Specification for Titanium and Titanium Alloy Strip, Sheet, and Plate
- B 338 Specification for Seamless and Welded Titanium and Titanium Alloy Tubes for Condensers and Heat Exchangers
- B 348 Specification for Titanium and Titanium Alloy Bars and Billets
- B 367 Specification for Titanium and Titanium Alloy Castings
- B 381 Specification for Titanium and Titanium Alloy Forgings
- B 600 Guide for Descaling and Cleaning Titanium and Titanium Alloy Surfaces
- B 861 Specification for Titanium and Titanium Alloy Seamless Pipe
- B 862 Specification for Titanium and Titanium Alloy Welded Pipe

#### 2.2 ANSI Standards:<sup>4</sup>

- B16.9 Wrought Steel Butt-Welding Fittings
- B36.19 Stainless Steel Pipe

#### 2.3 Manufacturers' Standardization Society of the Valve and Fittings Industry Standards:<sup>5</sup>

- 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:<sup>6</sup>

- 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,

<sup>1</sup> This specification is under the jurisdiction of ASTM Committee B10 on Reactive and Refractory Metals and Alloys and is the direct responsibility of Subcommittee B10.01 on Titanium.

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<sup>2</sup> For ASME Boiler and Pressure Vessel Code applications, see related Specification SB-363 in Section II of that Code.

<sup>3</sup> For referenced ASTM standards, visit the ASTM website, [www.astm.org](http://www.astm.org), or contact ASTM Customer Service at [service@astm.org](mailto:service@astm.org). For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

<sup>4</sup> Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036.

<sup>5</sup> Available from Manufacturers Standardization Society of the Valve and Fittings Industry (MSS), 127 Park St., NE, Vienna, VA 22180-4602.

<sup>6</sup> Available from American Society of Mechanical Engineers (ASME), ASME International Headquarters, Three Park Ave., New York, NY 10016-5990.

- 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 B 861 and B 862 for the particular grades referred to in Table 1.

#### 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

**TABLE 1 Permissible Raw Materials**

Grade <sup>A</sup>	Product and ASTM Designation					
	Pipe	Tube	Plate	Bar and Billet	Casting	Forging
WPT1	B 861/B 862 Grade 1	B 338 Grade 1	B 265 Grade 1	B 348 Grade 1	B 367 Grade C1	B 381 Grade F-1
WPT2	B 861/B 862 Grade 2	B 338 Grade 2	B 265 Grade 2	B 348 Grade 2	B 367 Grade C2	B 381 Grade F-2
WPT3	<del>B 861/B 862 Grade 3</del>	<del>B 338 Grade 3</del>	<del>B 265 Grade 3</del>	<del>B 348 Grade 3</del>	<del>B 367 Grade C3</del>	<del>B 381 Grade F-3</del>
WPT2H	B 861/B 862 Grade 2H	B 338 Grade 2H	B 265 Grade 2H	B 348 Grade 2H	B 367 Grade C2	B 381 Grade F-2H
WPT7	<del>B 861/B 862 Grade 7</del>	<del>B 338 Grade 7</del>	<del>B 265 Grade 7</del>	<del>B 348 Grade 7</del>	<del>B 367 Grade C7</del>	<del>B 381 Grade F-7</del>
WPT3	B 861/B 862 Grade 3	B 338 Grade 3	B 265 Grade 3	B 348 Grade 3	B 367 Grade C3	B 381 Grade F-3
WPT9	<del>B 861/B 862 Grade 9</del>	<del>B 338 Grade 9</del>	<del>B 265 Grade 9</del>	<del>B 348 Grade 9</del>	...	<del>B 381 Grade F-9</del>
WPT7	B 861/B 862 Grade 7	B 338 Grade 7	B 265 Grade 7	B 348 Grade 7	B 367 Grade C7	B 381 Grade F-7
WPT11	<del>B 861/B 862 Grade 11</del>	<del>B 338 Grade 11</del>	<del>B 265 Grade 11</del>	<del>B 348 Grade 11</del>	<del>B 367 Grade C11</del>	<del>B 381 Grade F-11</del>
WPT7H	B 861/B 862 Grade 7H	B 338 Grade 7H	B 265 Grade 7H	B 348 Grade 7H	B 367 Grade C7	B 381 Grade F-7H
WPT12	<del>B 861/B 862 Grade 12</del>	<del>B 338 Grade 12</del>	<del>B 265 Grade 12</del>	<del>B 348 Grade 12</del>	...	<del>B 381 Grade F-12</del>
WPT9	B 861/B 862 Grade 9	B 338 Grade 9	B 265 Grade 9	B 348 Grade 9	...	B 381 Grade F-9
WPT13	<del>B 861/B 862 Grade 13</del>	<del>B 338 Grade 13</del>	<del>B 265 Grade 13</del>	<del>B 348 Grade 13</del>	...	<del>B 381 Grade F-13</del>
WPT11	B 861/B 862 Grade 11	B 338 Grade 11	B 265 Grade 11	B 348 Grade 11	B 367 Grade C11	B 381 Grade F-11
WPT14	<del>B 861/B 862 Grade 14</del>	<del>B 338 Grade 14</del>	<del>B 265 Grade 14</del>	<del>B 348 Grade 14</del>	...	<del>B 381 Grade F-14</del>
WPT12	B 861/B 862 Grade 12	B 338 Grade 12	B 265 Grade 12	B 348 Grade 12	...	B 381 Grade F-12
WPT15	<del>B 861/B 862 Grade 15</del>	<del>B 338 Grade 15</del>	<del>B 265 Grade 15</del>	<del>B 348 Grade 15</del>	...	<del>B 381 Grade F-15</del>
WPT13	B 861/B 862 Grade 13	B 338 Grade 13	B 265 Grade 13	B 348 Grade 13	...	B 381 Grade F-13
WPT16	<del>B 861/B 862 Grade 16</del>	<del>B 338 Grade 16</del>	<del>B 265 Grade 16</del>	<del>B 348 Grade 16</del>	...	<del>B 381 Grade F-16</del>
WPT14	B 861/B 862 Grade 14	B 338 Grade 14	B 265 Grade 14	B 348 Grade 14	...	B 381 Grade F-14
WPT17	<del>B 861/B 862 Grade 17</del>	<del>B 338 Grade 17</del>	<del>B 265 Grade 17</del>	<del>B 348 Grade 17</del>	...	<del>B 381 Grade F-17</del>
WPT15	B 861/B 862 Grade 15	B 338 Grade 15	B 265 Grade 15	B 348 Grade 15	...	B 381 Grade F-15
WPT18	<del>B 861/B 862 Grade 18</del>	<del>B 338 Grade 18</del>	<del>B 265 Grade 18</del>	<del>B 348 Grade 18</del>	...	<del>B 381 Grade F-18</del>
WPT16	B 861/B 862 Grade 16	B 338 Grade 16	B 265 Grade 16	B 348 Grade 16	...	B 381 Grade F-16
WPT19	<del>B 861/B 862 Grade 19</del>	...	<del>B 265 Grade 19</del>	<del>B 348 Grade 19</del>	...	<del>B 381 Grade F-19</del>
WPT16H	B 861/B 862 Grade 16H	B 338 Grade 16H	B 265 Grade 16H	B 348 Grade 16H	...	B 381 Grade F-16H
WPT20	<del>B 861/B 862 Grade 20</del>	...	<del>B 265 Grade 20</del>	<del>B 348 Grade 20</del>	...	<del>B 381 Grade F-20</del>
WPT17	B 861/B 862 Grade 17	B 338 Grade 17	B 265 Grade 17	B 348 Grade 17	...	B 381 Grade F-17
WPT21	<del>B 861/B 862 Grade 21</del>	...	<del>B 265 Grade 21</del>	<del>B 348 Grade 21</del>	...	<del>B 381 Grade F-21</del>
WPT18	B 861/B 862 Grade 18	B 338 Grade 18	B 265 Grade 18	B 348 Grade 18	...	B 381 Grade F-18
WPT23	<del>B 861/B 862 Grade 23</del>	...	<del>B 265 Grade 23</del>	<del>B 348 Grade 23</del>	...	<del>B 381 Grade F-23</del>
WPT19	B 861/B 862 Grade 19	...	B 265 Grade 19	B 348 Grade 19	...	B 381 Grade F-19
WPT24	<del>B 861/B 862 Grade 24</del>	...	<del>B 265 Grade 24</del>	<del>B 348 Grade 24</del>	...	<del>B 381 Grade F-24</del>
WPT20	B 861/B 862 Grade 20	...	B 265 Grade 20	B 348 Grade 20	...	B 381 Grade F-20
WPT25	<del>B 861/B 862 Grade 25</del>	...	<del>B 265 Grade 25</del>	<del>B 348 Grade 25</del>	...	<del>B 381 Grade F-25</del>
WPT21	B 861/B 862 Grade 21	...	B 265 Grade 21	B 348 Grade 21	...	B 381 Grade F-21
WPT26	<del>B 861/B 862 Grade 26</del>	<del>B 338 Grade 26</del>	<del>B 265 Grade 26</del>	<del>B 348 Grade 26</del>	...	<del>B 381 Grade F-26</del>
WPT23	B 861/B 862 Grade 23	...	B 265 Grade 23	B 348 Grade 23	...	B 381 Grade F-23
WPT27	<del>B 861/B 862 Grade 27</del>	<del>B 338 Grade 27</del>	<del>B 265 Grade 27</del>	<del>B 348 Grade 27</del>	...	<del>B 381 Grade F-27</del>
WPT24	B 861/B 862 Grade 24	...	B 265 Grade 24	B 348 Grade 24	...	B 381 Grade F-24
WPT28	<del>B 861/B 862 Grade 28</del>	<del>B 338 Grade 28</del>	<del>B 265 Grade 28</del>	<del>B 348 Grade 28</del>	...	<del>B 381 Grade F-28</del>
WPT25	B 861/B 862 Grade 25	...	B 265 Grade 25	B 348 Grade 25	...	B 381 Grade F-25
WPT33	<del>B 861/B 862 Grade 33</del>	<del>B 338 Grade 33</del>	<del>B 265 Grade 33</del>	<del>B 348 Grade 33</del>	...	<del>B 381 Grade F-33</del>
WPT26	B 861/B 862 Grade 26	B 338 Grade 26	B 265 Grade 26	B 348 Grade 26	...	B 381 Grade F-26
WPT34	<del>B 861/B 862 Grade 34</del>	<del>B 338 Grade 34</del>	<del>B 265 Grade 34</del>	<del>B 348 Grade 34</del>	...	<del>B 381 Grade F-34</del>
WPT26H	B 861/B 862 Grade 26H	B 338 Grade 26H	B 265 Grade 26H	B 348 Grade 26H	...	B 381 Grade F-26H
WPT35	<del>B 861/B 862 Grade 35</del>	<del>B 338 Grade 35</del>	<del>B 265 Grade 35</del>	<del>B 348 Grade 35</del>	...	<del>B 381 Grade F-35</del>
WPT27	B 861/B 862 Grade 27	B 338 Grade 27	B 265 Grade 27	B 348 Grade 27	...	B 381 Grade F-27
WPT36	<del>B 861/B 862 Grade 36</del>	<del>B 338 Grade 36</del>	<del>B 265 Grade 36</del>	<del>B 348 Grade 36</del>	...	<del>B 381 Grade F-36</del>
WPT28	B 861/B 862 Grade 28	B 338 Grade 28	B 265 Grade 28	B 348 Grade 28	...	B 381 Grade F-28
WPT33	B 861/B 862 Grade 33	B 338 Grade 33	B 265 Grade 33	B 348 Grade 33	...	B 381 Grade F-33
WPT34	B 861/B 862 Grade 34	B 338 Grade 34	B 265 Grade 34	B 348 Grade 34	...	B 381 Grade F-34
WPT35	B 861/B 862 Grade 35	B 338 Grade 35	B 265 Grade 35	B 348 Grade 35	...	B 381 Grade F-35
WPT36	B 861/B 862 Grade 36	B 338 Grade 36	B 265 Grade 36	B 348 Grade 36	...	B 381 Grade F-36
WPT37	B 861/B 862 Grade 37	B 338 Grade 37	B 265 Grade 37	B 348 Grade 37	...	B 381 Grade F-37
WPT38	B 861/B 862 Grade 38	B 338 Grade 38	B 265 Grade 38	B 348 Grade 38	...	B 381 Grade F-38

<sup>A</sup> When fittings are of welded construction, the symbol shown shall be supplemented by the letter "W."