



## ASTM B363-06a

# Standard Specification for Seamless and Welded Unalloyed

## Titanium and Titanium Alloy Welding Fittings

### 1. Scope :-

1.1 This specification cover 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 stubends , and other types .

1.2 This standard does not purport to all of the safety concerns , if any , associated with is use 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 :-

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 specifications 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 :-

B 16.9 Wrought steel butt-welding fittings

B 36.19 Stainless steel pipe

#### 2.3 Manufacturers Standardization Society of the valve and fittings Industry Standards :-

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 :-

ASME Boiler and Pressure Vessel Code , section VIII and IX

### 3. Ordering Information :-

### 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 .

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 338	B 265	B 348	B 367	B 381

Direct No. :- +91-022-43431307 Fax No. :- +91-022-23894511 Email :- [sales@reliablefittings.com](mailto:sales@reliablefittings.com)

Board No. :- +91-022-43431313

Website :- [www.reliablefittings.com](http://www.reliablefittings.com)



### ASTM B363-06a

	B 862 Grade 1	Grade 1	Grade 1	Grade 1	Grade C1	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
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
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
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
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
WPT9	B 861/ B 862 Grade 9	B 338 Grade 9	B 265 Grade 9	B 348 Grade 9	.....	B 381 Grade F-9
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
WPT12	B 861/ B 862 Grade 12	B 338 Grade 12	B 265 Grade 12	B 348 Grade 12	.....	B 381 Grade F-12
WPT13	B 861/ B 862 Grade 13	B 338 Grade 13	B 265 Grade 13	B 348 Grade 13	.....	B 381 Grade F-13
WPT14	B 861/ B 862 Grade 14	B 338 Grade 14	B 265 Grade 14	B 348 Grade 14	.....	B 381 Grade F-14
WPT15	B 861/ B 862 Grade 15	B 338 Grade 15	B 265 Grade 15	B 348 Grade 15	.....	B 381 Grade F-15
WPT16	B 861/ B 862 Grade 16	B 338 Grade 16	B 265 Grade 16	B 348 Grade 16	.....	B 381 Grade F-16
WPT16H	B 861/ B 862 Grade 16H	B 338 Grade 16H	B 265 Grade 16H	B 348 Grade 16H	.....	B 381 Grade F-16H
WPT17	B 861/ B 862 Grade 17	B 338 Grade 17	B 265 Grade 17	B 348 Grade 17	.....	B 381 Grade F-17
WPT18	B 861/ B 862 Grade 18	B 338 Grade 18	B 265 Grade 18	B 348 Grade 18	.....	B 381 Grade F-18
WPT19	B 861/		B 265	B 348		B 381



### ASTM B363-06a

	B 862 Grade 19	.....	Grade 19	Grade 19	.....	Grade F-19
WPT20	B 861/ B 862 Grade 20	.....	B 265 Grade 20	B 348 Grade 20	.....	B 381 Grade F-20
WPT21	B 861/ B 862 Grade 21	.....	B 265 Grade 21	B 348 Grade 21	.....	B 381 Grade F-21
WPT23	B 861/ B 862 Grade 23	.....	B 265 Grade 23	B 348 Grade 23	.....	B 381 Grade F-23
WPT24	B 861/ B 862 Grade 24	.....	B 265 Grade 24	B 348 Grade 24	.....	B 381 Grade F-24
WPT25	B 861/ B 862 Grade 25	.....	B 265 Grade 25	B 348 Grade 25	.....	B 381 Grade F-25
WPT26	B 861/ B 862 Grade 26	B 338 Grade 26	B 265 Grade 26	B 348 Grade 26	.....	B 381 Grade F-26
WPT26H	B 861/ B 862 Grade 26H	B 338 Grade 26H	B 265 Grade 26H	B 348 Grade 26H	.....	B 381 Grade F-26H
WPT27	B 861/ B 862 Grade 27	B 338 Grade 27	B 265 Grade 27	B 348 Grade 27	.....	B 381 Grade F-27
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 38	B 348 Grade 38	.....	B 381 Grade F-38



## ASTM B363-06a

### Permissible Variation in Product Analysis

Element	Product Analysis Limits , max or Range , %	Permissible Variation in Product Analysis
Aluminium	0.5 to 2.5	+-0.20
Aluminium	2.5 to 6.75	+-0.40
Carbon	0.10	+0.02
Chromium	0.1 to 0.2	+-0.02
Chromium	5.5 to 6.5	+-0.30
Hydrogen	0.02	+0.002
Iron	0.80	+0.15
Iron	1.2 to 1.8	+-0.20
Molybdenum	0.2 to 0.4	+-0.03
Molybdenum	1.5 to 4.5	+-0.20
Molybdenum	14.0 to 16.0	+-0.50
Nickel	0.3 to 0.9	+-0.05
Niobium	2.2 to 3.2	+-0.15
Niobium	>30	+-50
Nitrogen	0.05	+0.02
Oxygen	0.30	+0.03
Oxygen	0.31 to 0.40	+-0.04
Palladium	0.01 to 0.02	+-0.002
Palladium	0.04 to 0.08	+-0.005
Palladium	0.12 to 0.25	+-0.02
Ruthenium	0.02 to 0.04	+-0.005
Ruthenium	0.04 to 0.06	+-0.005
Ruthenium	0.08 to 0.14	+-0.01
Silicon	0.06 to 0.40	+-0.02
Vanadium	2.0 to 4.5	+-0.15
Vanadium	7.5 to 8.5	+-0.40
Zirconium	3.5 to 4.5	+-0.20
Residuals (each)	0.15	+0.02

#### 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 .

#### 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 .



## ASTM B363-06a

- 6.2 The chemical analysis of the components of the fittings need not be reported unless by 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 .
- 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 manufacture 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 manufacture and the purchaser and so stated in the order .
9. Workmanship , Finish and Appearance :-
10. Hydrostatic Tests :-
- 10.1 All fittings shall be capable of withstanding without failure , leakage , or impairment of their serviceability , a test pressure prescribed in the specification for the pipe or tubing with which the fitting is recommended to be used (see Table 1) .
- 10.2 Hydrostatic tests need not be performed or reported , unless required by agreement between the manufacture and the purchaser and so stated on the order .
11. Inspection and Certification
12. Rejection
13. Product Marking
14. Keywords :-
- 14.1 fittings ; seamless fittings ; titanium ; titanium alloy welded fittings .

### SUPPLEMENTARY REQUIREMENTS :-

- S1. Surface Inspection
- S2. Radiographic Inspection of Welds
- S3. Stress Relief Heat Treatment
- S4. Certification of Material Incorporated in the Manufacture of the fittings