



Designation: B 817 – 03

Standard Specification for Powder Metallurgy (P/M) Titanium Alloy Structural Components¹

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1. Scope

1.1 This specification covers powder metallurgy (P/M) structural components fabricated from commercially pure (CP) titanium powder mixed with master alloy powder and elemental powders in appropriate quantity to yield combined material chemistries comparable to ingot metallurgy (I/M) alloys Titanium 6Al-4V and Titanium 6Al-6V-2Sn.

1.2 This specification covers the following materials:

1.2.1 Two types depending on alloy composition as detailed in Table 1.

1.2.1.1 Type I is comparable to I/M Ti-6Al-4V.

1.2.1.2 Type II is comparable to I/M Ti-6Al-6V-2Sn.

1.2.2 Two grades of each type that result from the specific titanium powder used are as follows:

1.2.2.1 Grade 1 is made from sponge fines with residual levels of chlorine and sodium.

1.2.2.2 Grade 2 is made from hydride/dehydride (HDH) or other process titanium with significantly lower chlorine and sodium content.

1.2.3 Two classes as a function of density (see Table 2) are as follows:

1.2.3.1 Class A density ratio is 94 % minimum.

1.2.3.2 Class B density ratio is 99 % minimum. (**Warning**—CP titanium powder may be pyrophoric; its use may involve an explosion hazard.)

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

1.4 *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. Specific precautionary statements are given in 1.2.3.2.*

¹ This specification is under the jurisdiction of ASTM Committee B09 on Metal Powders and Metal Powder Products and is the direct responsibility of Subcommittee B09.11 on Near Full Density Powder Metallurgy Materials.

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TABLE 1 Chemical Composition Requirements

Element	Composition, Weight %			
	Grade 1		Grade 2	
	Type I	Type II	Type I	Type II
Aluminum	5.50/6.75	5.0/6.0	5.50/6.75	5.0/6.0
Vanadium	3.50/4.50	5.0/6.0	3.50/4.50	5.0/6.0
Tin	N/A ^A	1.5/2.5	N/A ^A	1.5/2.5
Iron	0.40 max	0.35/1.0	0.40 max	0.35/1.0
Copper	N/A ^A	0.35/1.0	N/A ^A	0.35/1.0
Oxygen, max	0.30	0.30	0.30	0.30
Hydrogen, max	0.015	0.015	0.015	0.015
Nitrogen, max	0.04	0.04	0.04	0.04
Carbon, max	0.10	0.10	0.10	0.10
Sodium, max	0.20	0.20	TBD ^B	TBD ^B
Chlorine, max	0.20	0.20	TBD ^B	TBD ^B
Silicon, max	0.10	0.10	0.10	0.10
Residual elements each, max	0.10	0.10	0.10	0.10
Residual elements total, max	0.40	0.40	0.40	0.40
Titanium	remainder	remainder	remainder	remainder

^A Not applicable.

^B Various chloride levels may be available between the standard 0.20 max and the wrought equivalent of 0.001 max. The acceptable level for specific product applications shall be agreed upon between the purchaser and supplier and specified on the purchase order.

2. Referenced Documents

2.1 *ASTM Standards*:

B 243 Terminology of Powder Metallurgy²

B 311 Test Method for Density Determination for Powder Metallurgy (P/M) Materials Containing Less Than Two Percent Porosity²

B 328 Test Methods for Density, Oil Content, and Interconnected Porosity of Sintered Powder Metal Structural Parts and Oil-Impregnated Bearings²

3. Terminology

3.1 *Definitions*—Definitions of powder metallurgy terms can be found in Terminology B 243.

² *Annual Book of ASTM Standards*, Vol 02.05.