

Haynes Ti-3Al-2.5V Alloy Titanium Tubing

Category : Metal , Nonferrous Metal , Titanium Alloy , Alpha/Near Alpha Titanium Alloy

Material Notes:

Haynes® Ti-3Al-2.5V alloy is both lightweight and strong, providing a major design advantage - saving weight. Specific alloying additives, notably aluminum, raise the temperature at which a titanium alloy transforms completely to the beta phase (the beta transus temperature). The addition of vanadium lowers the temperature of transformation of alpha to beta phases. Ti-6Al-4V is used as an aircraft/aerospace alloy because it has a good strength-to-weight ratio as annealed combined with resistance to cracking during forging, fair to good weldability and is heat treatable to high strengths. Because Ti-6Al-4V alloy does not have good cold forming characteristics, Ti-3Al-2.5V was developed for tubing and foil applications. Ti-3Al-2.5V is intermediate in strength between commercially pure titanium and Ti-6Al-4V. It has properties 30 to 50 percent higher than pure titanium, but more importantly has the excellent cold formability needed to make seamless tubing. Forming: Seamless tubing of Haynes Ti-3Al-2.5V alloy is readily formed cold on conventional tube bending equipment of the same type used for stainless steel. Tubing can be bent 180 degrees around a suitable bend die with a centerline radius equal to 3 to 5 times the nominal outside diameter of the tubing. Relatively thin wall tubing should be bent using tubing fillers or other inside diameter constraints. Haynes Ti-3Al-2.5V tubing is readily welded by the standard gas tungsten arc process with inert gas shielding and by the use of automatic welding tools and built-in gas purge chambers. Machine settings similar to those used for stainless steels are used when welding Ti-3Al-2.5V tubing. Seamless tubing of Haynes Ti-3Al-2.5V alloy was developed for aircraft hydraulic and fuel systems. Its performance has been proven in high technology military aircraft and spacecraft as well as in commercial aircraft. It is also used for tubing for bicycle frames. The high strength and light weight characteristics are ideal for this product. Haynes Ti-3Al-2.5V seamless tubing is normally supplied in either the annealed or cold worked and stress relieved condition. Temperatures used generally range from 700 deg. F to 1450 deg. F (371 deg. C to 790 deg. C) depending on the degree of recrystallization or stress relief that is required for a given end use. Heat-treatment is done in vertical vacuum annealing furnaces. Vertical annealing has two advantages over horizontal annealing. Tubes hung vertically can be arranged so that each tube receives uniform furnace heat. Also, tubes annealed vertically tend to remain straight and round. Typical specification to which seamless tubing of this alloy can be supplied for Aerospace are AMS 4943, AMS 4944, AMS 4945, and ABS 5004. Commercial specifications are ASTM B-337 and B-338. Many of the aircraft/aerospace companies have their own specifications for this product. Data provided by the manufacturer, Haynes International, Inc.

Order this product through the following link:

http://www.lookpolymers.com/polymer_Haynes-Ti-3Al-25V-Alloy-Titanium-Tubing.php

Physical Properties	Metric	English	Comments
Density	4.48 g/cc	0.162 lb/in ³	

Mechanical Properties	Metric	English	Comments
Tensile Strength, Ultimate	>= 621 MPa	>= 90100 psi	Annealed; AMS 4943
	>= 862 MPa	>= 125000 psi	CWSR, 0.016 in. Wall & Below; AMS 4944/4945
	@Thickness <=0.400 mm	@Thickness <=0.0157 in	
	>= 862 MPa	>= 125000 psi	CWSR, Above 0.016 in. Wall; AMS

Mechanical Properties	@Thickness >=0.400 Metric	@Thickness >=0.0157 English	4944/4945 Comments
	690 - 920 MPa @Diameter 6.35 mm	100000 - 133000 psi @Diameter 0.250 in	CWSR; DAN 2700.9
	870 - 1030 MPa @Diameter 9.52 mm	126000 - 149000 psi @Diameter 0.375 in	CWSR; DAN 2700.9
	870 - 1030 MPa @Diameter 12.7 - 25.4 mm	126000 - 149000 psi @Diameter 0.500 - 1.00 in	CWSR; DAN 2700.9
Tensile Strength, Yield	>= 517 MPa @Strain 0.200 %	>= 75000 psi @Strain 0.200 %	Annealed; AMS 4943
	>= 724 MPa @Strain 0.200 %, Thickness <=0.400 mm	>= 105000 psi @Strain 0.200 %, Thickness <=0.0157 in	CWSR, 0.016 in. Wall & Below; AMS 4944/4945
	>= 724 MPa @Strain 0.200 %, Thickness >=0.400 mm	>= 105000 psi @Strain 0.200 %, Thickness >=0.0157 in	CWSR, Above 0.016 in. Wall; AMS 4944/4945
	>= 655 MPa @Strain 0.200 %, Diameter 6.35 mm	>= 95000 psi @Strain 0.200 %, Diameter 0.250 in	CWSR; DAN 2700.9
	>= 730 MPa @Strain 0.200 %, Diameter 9.52 mm	>= 106000 psi @Strain 0.200 %, Diameter 0.375 in	CWSR; DAN 2700.9
	>= 730 MPa @Diameter 12.7 - 25.4 mm, Strain 0.200 %	>= 106000 psi @Diameter 0.500 - 1.00 in, Strain 0.200 %	CWSR; DAN 2700.9
Elongation at Break	>= 15 %	>= 15 %	with 2-inch (50 mm) gage length, Annealed; AMS 4943
	>= 8.0 % @Thickness <=0.400 mm	>= 8.0 % @Thickness <=0.0157 in	with 2-inch (50 mm) gage length, CWSR, 0.016 in. Wall & Below; AMS 4944/4945
	>= 10 % @Thickness >=0.400 mm	>= 10 % @Thickness >=0.0157 in	with 2-inch (50 mm) gage length, CWSR, Above 0.016 in. Wall; AMS 4944/4945
	>= 14 % @Diameter 6.35 mm	>= 14 % @Diameter 0.250 in	with 2-inch (50 mm) gage length, CWSR; DAN 2700.9

Mechanical Properties	Metric	English	Comments
	$\geq 14\%$ @Diameter 9.52 mm	$\geq 14\%$ @Diameter 0.375 in	with 2-inch (50 mm) gage length, CWSR; DAN 2700.9
	$\geq 16\%$ @Diameter 12.7 - 25.4 mm	$\geq 16\%$ @Diameter 0.500 - 1.00 in	with 2-inch (50 mm) gage length, CWSR; DAN 2700.9

Thermal Properties	Metric	English	Comments
Melting Point	1705 Å°C	3101 Å°F	

Component Elements Properties	Metric	English	Comments
Aluminum, Al	3.0 %	3.0 %	
Carbon, C	$\leq 0.050\%$	$\leq 0.050\%$	
Iron, Fe	$\leq 0.25\%$	$\leq 0.25\%$	
Nitrogen, N	$\leq 0.020\%$	$\leq 0.020\%$	
Oxygen, O	$\leq 0.12\%$	$\leq 0.12\%$	
Titanium, Ti	$\leq 94\%$	$\leq 94\%$	as balance
Vanadium, V	2.5 %	2.5 %	

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