

TIMET TIMETAL® 685 (Ti-6Al-5Zr-0.5Mo-0.25Si) Titanium Alloy

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

Material Notes:

High-Temperature, High-Strength Creep Resistant Alloy Industry Specifications: Germany Aerospace: 3.7154. France: T-A6ZD. UK Aerospace Specifications BS TA. 43, 44. Features: TIMETAL 685 possesses excellent tensile strength and creep resistance up to 520°C. It is weldable and has good forging characteristics. The alloy may be joined by the processes normally used in the fabrication of titanium, including argon-arc, electron beam and friction welding. Material should be fully heat treated prior to welding, and also given a suitable post-weld treatment. The weld zone of material treated in this way will have similar structure and properties to the parent metal. This alloy was specifically designed for the aero-engine industry. It is nonmagnetic. Typical heat treatment for this alloy: Solution heat treatment: 1050°C for 30 mins, oil quench. Aging heat treatment: 550°C for 24 hours, air cool. Data provided by TIMET.

Order this product through the following link:

http://www.lookpolymers.com/polymer_TIMET-TIMETAL-685-Ti-6Al-5Zr-05Mo-025Si-Titanium-Alloy.php

Physical Properties	Metric	English	Comments
Density	4.45 g/cc	0.161 lb/in ³	Typical

Mechanical Properties	Metric	English	Comments
Tensile Strength, Ultimate	1030 MPa	149000 psi	Typical
Tensile Strength, Yield	900 MPa @Strain 0.200 %	131000 psi @Strain 0.200 %	Typical
Elongation at Break	10 %	10 %	Typical in 5D
Reduction of Area	20 %	20 %	
Modulus of Elasticity	125 GPa	18100 ksi	Typical
Notched Tensile Strength	1648 MPa	239000 psi	Kt=3
Poissons Ratio	0.33	0.33	Calculated by MatWeb
Fatigue Strength	440 MPa @# of Cycles 1.00e+7	63800 psi @# of Cycles 1.00e+7	alternating direct-stress (zero mean stress)
	630 MPa @# of Cycles 100000	91400 psi @# of Cycles 100000	alternating direct-stress (zero mean stress)
Fracture Toughness	68.0 MPa-m ^{1/2}	61.9 ksi-in ^{1/2}	K(IC); Typical
Shear Modulus	47.0 GPa	6820 ksi	
Charpy Impact	43.0 J @Diameter 25.0 mm	31.7 ft-lb @Diameter 0.984 in	rod

Mechanical Properties	Metric	English	Comments
Thermal Properties	Metric	English	Comments
CTE, linear	9.50 $\mu\text{m}/\text{m}\cdot^\circ\text{C}$	5.28 $\mu\text{in}/\text{in}\cdot^\circ\text{F}$	
	@Temperature 20.0 - 300 $^\circ\text{C}$	@Temperature 68.0 - 572 $^\circ\text{F}$	
	9.70 $\mu\text{m}/\text{m}\cdot^\circ\text{C}$	5.39 $\mu\text{in}/\text{in}\cdot^\circ\text{F}$	
	@Temperature 20.0 - 100 $^\circ\text{C}$	@Temperature 68.0 - 212 $^\circ\text{F}$	
	10.1 $\mu\text{m}/\text{m}\cdot^\circ\text{C}$	5.61 $\mu\text{in}/\text{in}\cdot^\circ\text{F}$	
	@Temperature 20.0 - 500 $^\circ\text{C}$	@Temperature 68.0 - 932 $^\circ\text{F}$	
Thermal Conductivity	4.15 W/m-K	28.8 BTU-in/hr-ft ² - $^\circ\text{F}$	
Maximum Service Temperature, Air	520 $^\circ\text{C}$	968 $^\circ\text{F}$	Good creep resistance
Beta Transus	1020 $^\circ\text{C}$	1870 $^\circ\text{F}$	

Component Elements Properties	Metric	English	Comments
Aluminum, Al	5.7 - 6.3 %	5.7 - 6.3 %	
Carbon, C	<= 0.080 %	<= 0.080 %	
Iron, Fe	<= 0.050 %	<= 0.050 %	
Molybdenum, Mo	0.25 - 0.75 %	0.25 - 0.75 %	
Nitrogen, N	<= 0.030 %	<= 0.030 %	
Oxygen, O	<= 0.20 %	<= 0.20 %	
Silicon, Si	0.015 - 0.35 %	0.015 - 0.35 %	
Titanium, Ti	85.8 - 89.5 %	85.8 - 89.5 %	Calculated as remainder
Zirconium, Zr	4.5 - 6.0 %	4.5 - 6.0 %	

Electrical Properties	Metric	English	Comments
Electrical Resistivity	0.000167 ohm-cm	0.000167 ohm-cm	

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