Bio-Infinitum®
BiiB = Bio-Infinitum Implant Bridge!

STONEGLASS Industries

Titanium Material Data Sheet

Application: Biomedical implants

Biocompatibility: Excellent especially when direct contact with tissue or bone is required. Ti-6Al-4V's poor shear strength makes it undesirable for bone screws or plates. It also has poor surface wear properties and tends to seize when in sliding contact with itself and other metals. Surface treatments such as nitriding and oxidizing can improve the surface wear properties.

Key Words: Ti-6-4; UNS R56400; ASTM Grade 5 titanium; UNS R56401 (ELI); Ti6A14V, biomaterials, biomedical implants, biocompatibility.

Physical Properties	Metric	English	Comments
Density	4.43 g/cc	0.160 lb/in^3	

Mechanical Properties	Metric	English	Comments
Hardness, Brinell	334	334	Estimated from Rockwell C.
Hardness, Knoop	363	363	Estimated from Rockwell C.
Hardness, Rockwell C	36.0	36.0	
Hardness, Vickers	349	349	Estimated from Rockwell C.
Tensile Strength, Ultimate	950MPa	138000 psi	
Tensile Strength, Yield	880 MPa	128000 psi	
Elongation at Break	14.0%	14.0%	
Reduction of Area	36.0%	36.0%	
Modulus of Elasticity	113.8 GPa	16510 ksi	
Compressive Yield Strength	970 MPa	141000 psi	
Notched Tensile Strength	1450 MPa	210000 psi	K_t (stress concentration factor) = 6.7
Ultimate Bearing Strength	1860 MPa	270000 psi	e/D = 2

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Mechanical Properties	Metric	English	Comments
Bearing Yield Strength	1480 MPa	215000 psi	e/D = 2
Poissons Ratio	0.342	0.342	
Charpy Impact	17.0 J	12.5 ft-lb	V-notch
Fatigue Strength	240 MPa @# of Cycles 1.00e+7	34800 psi @# of Cycles 1.00e+7	K_t (stress concentration factor) = 3.3
	510 MPa @# of Cycles 1.00e+7	74000 psi @# of Cycles 1.00e+7	Unnotched
Fracture Toughness	75.0 MPa-m½	68.3 ksi-in½	
Shear Modulus	44.0 GPa	6380 ksi	
Shear Strength	550 MPa	79800 psi	Ultimate shear strength

Electrical Properties	Metric	English	Comments
Electrical Resistivity	0.000178 ohm-cm	0.000178 ohm-cm	
Magnetic Permeability	1.00005	1.00005	at 1.6kA/m
Magnetic Susceptibility	0.00000330	0.00000330	cgs/g

Material Components Properties	Metric	English	Comments
Aluminum, Al	6.00%	6.00%	
Iron, Fe	<=0.250%	<=0.250%	
Oxygen, O	<=0.200%	<=0.200%	
Titanium, Ti	90.0%	90.0%	
Vanadium, V	4.00%	4.00%	

Thermal Properties	Metric	English	Comments
CTE, linear	8.60 µm/m-°C @Temperature 20.0-100°C	4.78µin/in-°F @Temperature 68.0-212°F	
	9.20 µm/m-°C @Temperature 20.0-315°C	5.11 µin/in-°F @Temperature 68.0-599°F	average
	9.70 µm/m-°C @Temperature 20.0-650°C	5.39 µin/in-°F @Temperature 68.0-1200°F	average
Specific Heat Capacity	0.5263J/g-°C	0.1258 BTU/lb-°F	
Thermal Conductivity	6.70 W/m-K	46.5 BTU-in/hr-ft^2-°F	
Melting Point	1604-1660 °C	2919 – 3020 °F	
Solidus	1604 °C	2919 °F	
Liquidus	1660 °C	3020 °F	
Beta Transus	980 °C	1800 °F	