

TIMETAL[®] 679**HIGH-TEMPERATURE, HIGH-STRENGTH CREEP RESISTANT ALLOY**

TIMETAL 679 is a three-phase titanium alloy at room temperature, having an alpha + beta + compound structure.

This transforms to beta + compound at about 1742°F (950°C).

To develop optimum mechanical properties, hot working should be restricted to the alpha + beta + compound field and a maximum temperature of 1697°F (925°C) is recommended.

TABLE 1

CHEMICAL COMPOSITION

ELEMENT	WEIGHT %	
	Minimum	Maximum
Tin	10.50	11.50
Zirconium	4.00	6.00
Aluminum	2.00	2.50
Molybdenum	0.80	1.20
Silicon	0.10	0.50
Iron	—	0.20
Oxygen	—	0.20
Hydrogen	—	0.0125
Titanium	Remainder	

TABLE 2

PHYSICAL PROPERTIES

PROPERTY	VALUE	
	English	SI
Density	0.175 lb in ⁻³	4.84 g cm ⁻³
Beta Transus	1742°F	950°C
Thermal Conductivity*	4.80 Btu h ⁻¹ ft ⁻¹ °F ⁻¹	8.30 W m ⁻¹ K ⁻¹
Electrical Resistivity*	63 μΩ•in	1.60 μΩ•m
Magnetic Nonmagnetic Permeability		
Mean Coefficient of Thermal Expansion*	4.6 x 10 ⁻⁶ in in ⁻¹ °F ⁻¹	8.3 x 10 ⁻⁶ m m ⁻¹ °C ⁻¹
Elastic Modulus*	~15.5 Msi	~107 GPa
Rigidity Modulus*	6.7 Msi	46 GPa

* Typical values at ambient temperature, 68-78°F (20-25°C)

TABLE 3

HEAT TREATMENT

Solution Heat Treatment

+

Aging Heat Treatment

1650°F (900°C) / 30 minutes / Air Cool

930°F (500°C) / 24 hours / Air Cool

Faster cooling from solution heat treatment temperature by oil quenching, will increase tensile strength, while slightly decreasing ductility.

TABLE 4

TYPICAL CREEP RESISTANCE AND STABILITY**AIR COOLED AND AGED CONDITION**

Test Temperature	Creep Test Conditions		Subsequent Post-Creep Tensile Test*			
	Stress ksi (MPa)	Total Plastic Strain in 300 hours %	0.2% YS ksi (MPa)	UTS ksi (MPa)	Elongation 5D%	Reduction in Area %
752°F (400°C)	81 (560)	0.087	157 (1080)	167 (1150)	19	43
842°F (450°C)	51 (350)	0.085	154 (1060)	174 (1200)	14	40
932°F (500°C)	28 (193)	0.094	154 (1060)	165 (1140)	18	43

* The creep test piece is subjected to a room temperature tensile test after surface removal.



TABLE 5

TYPICAL MECHANICAL PROPERTIES

AIR COOLED AND AGED CONDITION

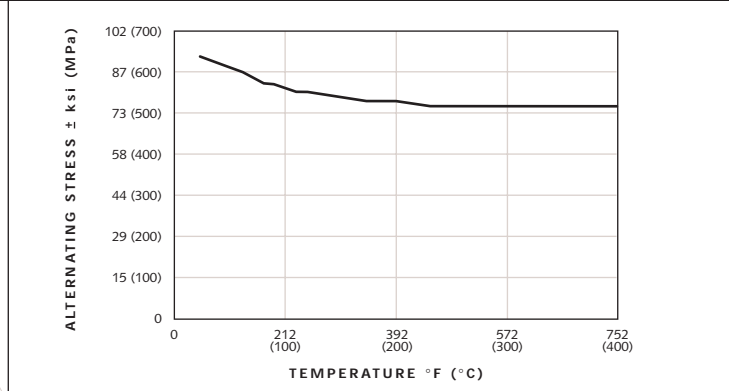
Material Condition	Test Temperature	0.2% YS ksi (MPa)	UTS ksi (MPa)	Elongation 5D%	Reduction in Area %	Notched Tensile Strength (K _t = 3)
Air Cooled and Aged	68°F (20°C)*	127 (880)	149 (1030)	8	30	1.4-1.64 x actual tensile strength
	212°F (100°C)	120 (829)	138 (954)	18	47	-
	392°F (200°C)	107 (739)	129 (891)	19	49	-
	572°F (300°C)	98 (679)	123 (851)	18	49	-
	752°F (400°C)	93 (644)	120 (828)	17	48	-
Oil Quenched and Aged	68°F (20°C)*	140 (970)	161 (1110)	8	25	1.33-1.52 x actual tensile strength
	212°F (100°C)	136 (940)	162 (1118)	14	43	-
	392°F (200°C)	119 (819)	148 (1021)	15	46	-
	572°F (300°C)	107 (738)	143 (986)	14	46	-
	752°F (400°C)	102 (701)	135 (932)	14	46	-
	842°F (450°C)	100 (688)	130 (899)	14	45	-

* Minimum mechanical property values quoted.

FIGURE 1

FATIGUE PROPERTIES

AIR COOLED AND AGED CONDITION



The data and other information contained herein are derived from a variety of sources which TIMET believes are reliable. Because it is not possible to anticipate specific uses and operating conditions, TIMET urges you to consult with our technical service personnel on your particular applications.

For more information, please contact the TIMET Sales Office/Service Center nearest you, TIMET's Technical Laboratories or TIMET's Website @ www.timet.com

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