

TIMETAL[®] 8-1-1

NEAR- α ALLOY WITH SUPERIOR CREEP RESISTANCE

TIMETAL[®] 8-1-1 is a near alpha alloy with superior creep resistance. TIMETAL[®] 8-1-1 can provide creep resistance at operating temperatures up to 450°C (842°F) and is used primarily in engine applications such as forged compressor blades and disks. This alloy has a relatively high tensile modulus to density ratio compared to most other commercial titanium alloys. Good weldability is another advantage of TIMETAL[®] 8-1-1.

TABLE 1

CHEMICAL COMPOSITION			
ELEMENT	WEIGHT %		
	Min.	Max.	Nominal
Aluminum	7.35	8.3	7.85
Vanadium	0.75	1.25	1.0
Iron	-	0.15	-
Molybdenum	0.75	1.25	1.0
Carbon	-	0.08	-
Nitrogen	-	0.05	-
Oxygen	0.06	0.12	0.85
Hydrogen	-	0.004	-
Residuals (each)	0.1		-
Residuals (total)	0.3		-

TABLE 2

PHYSICAL PROPERTIES		
PROPERTY	VALUE	
	English	SI
Density	0.156 lb/in ³	4.37 g/cm ³
Beta Transus	1900 ± 30 °F	1040 ± 17 °C
Tensile Modulus	Duplex Annealed 1650°F / 1hr / AC + 1100°F / 24hr / AC	
At 75° F	19 Msi	135 GPa
At 716 °F	16 Msi	113 GPa

TABLE 3

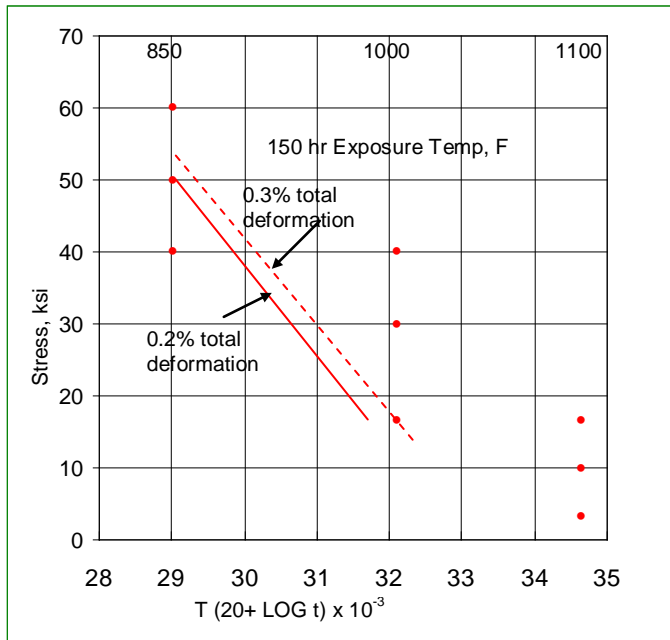
SELECTED THERMAL PROPERTIES			
Temperature, °F (°C)	Electrical Resistivity, $\mu\Omega$ -cm	Conductivity λ , Btu.ft/h.ft ² . °F (W/m.K)	Coefficient of Thermal Expansion 10^{-6} in in ⁻¹ °F ⁻¹ ($\times 10^{-6}$ mm ⁻¹ °C ⁻¹)
75 (24)	198.6	3.46 (5.98)	-
200 (93)	201.3	3.94 (6.82)	Temp range 68-212°F: 4.7 (8.46)
400 (204)	202.7	4.76 (8.23)	Temp range 68-392°F: 4.9 (8.82)
600 (315)	201.2	5.64 (9.75)	Temp range 68-572°F: 5.0 (9.00)
800 (427)	201.1	6.48 (11.21)	Temp range 68-752°F: 5.2 (9.36)
1000 (538)	203.4	7.23 (12.51)	Temp range 68-932°F: 5.4 (9.72)
1200 (649)	206.0	7.98 (13.80)	Temp range 68-1112°F: 6.0 (10.8)

TABLE 4

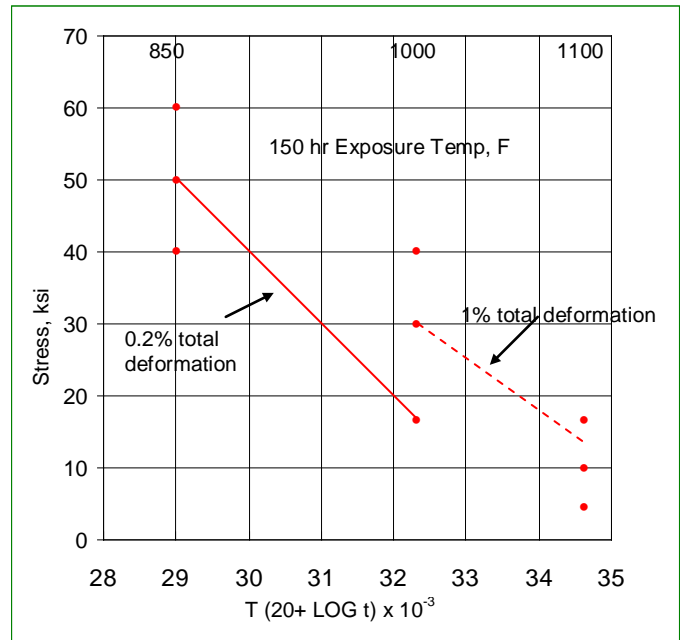
TENSILE PROPERTIES AT ROOM TEMPERATURE		
	Forgings	Rolled Bar
UTS, ksi (MPa)	130 (896)	130 (896)
0.2% Yield Strength, ksi (MPa)	120 (827)	120 (827)
Elongation (%)	10	10
Reduction in Area	20	25

FIGURE 1

CREEP BEHAVIOR - LARSON-MILLER PARAMETER VS STRESS



0.5" rd bar, heat treated 1650°F / 1hr/ AC + 1100°F/8hr/ AC



0.5" rd bar, heat treated 1800°F / 1hr/ AC + 1100°F/8hr/ AC

TABLE 5

TYPICAL ROTATING BEAM FATIGUE PROPERTIES OF ROLLED HEAT-TREATED BARSTOCK

Thermal Treatment	Stress, ksi	Cycles to Failure
1400°F, 24 hrs, AC	105	45,000 and 55,000
	100	50,000
	95	200,000
	90	140,000
	85	Run out at 10 ⁶
	82	7,000,000
	80	Run out at 10 ⁶
	1800°F, 4 hrs, AC + 1000°F, 24 hrs, AC	105
100		140,000
95		200,000 and 300,000
90		1,100,000 and 3,000,000
85		Run out at 10 ⁶
82.5		Run out at 10 ⁶

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 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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