

Ti-5.8Al-4Sn-3.5Zr-0.7Nb-0.5Mo-0.35Si-0.06C

TIMETAL[®] 834

HIGH STRENGTH, HIGH TEMPERATURE, CREEP RESISTANT ALLOY

TIMETAL 834 is a near alpha alloy offering increased tensile strength and creep resistance up to 1110°F (600°C), together with improved fatigue strength when compared with TIMETAL[®] 6242, TIMETAL[®] 829 and TIMETAL[®] 685. The alloy derives its properties from solid-solution strengthening, and heat treatment high in the alpha + beta phase field.

It retains a good level of properties up to around 3 in (75mm) diameter, with small reductions in strength in larger sections.

TIMETAL 834 has good forgeability and is weldable using all of the established titanium welding techniques.

Major uses for TIMETAL 834 include rings, compressor discs and blades for aeroplanes.

TABLE 1

CHEMICAL COMPOSITION

ELEMENT	WEIGHT %	
	Minimum	Maximum
Aluminum	5.50	6.10
Tin	3.00	5.00
Zirconium	3.00	5.00
Niobium	0.50	1.00
Molybdenum	0.25	0.75
Silicon	0.20	0.60
Carbon	0.04	0.08
Iron	—	0.05
Oxygen	0.075	0.15
Nitrogen	—	0.03
Hydrogen	—	0.006
Residual Elements, each	—	0.05
Residual Elements, total	—	0.20
Titanium	Remainder	

TABLE 2

PHYSICAL PROPERTIES

PROPERTY	VALUE	
	English	SI
Density	0.164 lb in ⁻³	4.55 g cm ⁻³
Beta Transus	1913°F	1045°C
Thermal Conductivity*	4.08 Btu hr ⁻¹ ft ⁻¹ °F ⁻¹	7.06 W m ⁻¹ K ⁻¹
Magnetic Permeability	Nonmagnetic	
Mean Coefficient of Thermal Expansion		
68-392°F (20-200°C)	5.9 x 10 ⁻⁶ in in ⁻¹ °F ⁻¹	10.6 x 10 ⁻⁶ m m ⁻¹ °C ⁻¹
68-752°F (20-400°C)	6.1 x 10 ⁻⁶ in in ⁻¹ °F ⁻¹	10.9 x 10 ⁻⁶ m m ⁻¹ °C ⁻¹
68-1112°F (20-600°C)	6.1 x 10 ⁻⁶ in in ⁻¹ °F ⁻¹	10.9 x 10 ⁻⁶ m m ⁻¹ °C ⁻¹
Elastic Modulus*	~17.4 Msi	~120 GPa

* Typical values at room temperature of about 68-78°F (20-25°C).

TABLE 3

HEAT TREATMENT

Solution Heat Treatment ^a	+	Aging Heat Treatment
1859°F (1015°C) / 2 hours / Oil Quench ^b		1292°F (700°C) 2 hours / Air Cool

^a Target alpha content of 15%.

^b For solutions less than 0.6 in (15mm), air cooling is recommended.

TABLE 4

MINIMUM MECHANICAL PROPERTIES

Test Temperature	UTS ksi (MPa)	0.2% YS ksi (MPa)	Elongation 5D %	Reduction in Area %	Notched Tensile Strength K _t =3	Fracture Toughness K _{1c} ksi√in (MPa√m)
68°F (20°C)	149 (1030)	132 (910)	6	15	1.45 x actual tensile strength	40 (45)
1112°F (600°C)	85 (585)	65 (450)	9	20	—	—



TABLE 5

TYPICAL ELEVATED TEMPERATURE TENSILE PROPERTIES

TIMETAL 834 DISC FORGINGS				
Test Temperature °F (°C)	0.2% YS ksi (MPa)	UTS ksi (MPa)	Elongation 5D %	Reduction in Area %
68 (20)	135 (932)	151 (1039)	12	21
212 (100)	121 (837)	139 (957)	12	24
392 (200)	108 (743)	129 (887)	13	28
572 (300)	101 (697)	121 (832)	13	31
752 (400)	96 (663)	116 (797)	13	37
932 (500)	88 (605)	112 (771)	14	42
1112 (600)	73 (500)	95 (654)	15	50

TABLE 6

CREEP PROPERTIES

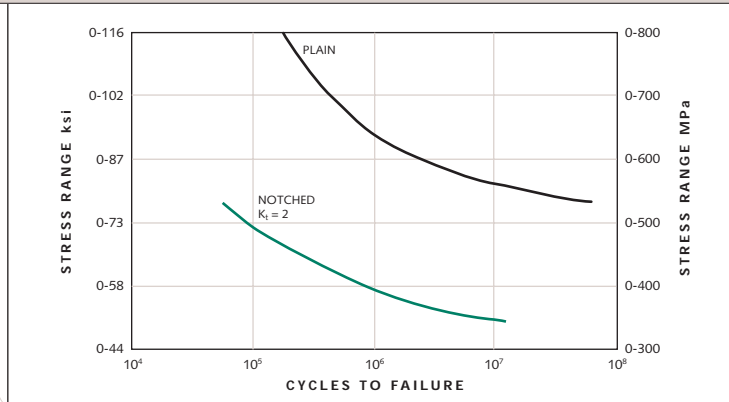
CREEP TEST (TYPICAL)			
Test Temperature	Time hours	Stress ksi (MPa)	Total Plastic Strain %
1112°F (600°C)	100	22 (150)	0.082

POST-CREEP TENSILE TEST* (MINIMUM)			
0.2% YS ksi (MPa)	UTS ksi (MPa)	Elongation 5D %	Reduction in Area %
131 (905)	149 (1025)	5	8

* Surface removed.

FIGURE 1

FATIGUE PROPERTIES



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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