

TIMETAL® 1100**HIGH STRENGTH, HIGH TEMPERATURE ALLOY**

TIMETAL® 1100 is a near alpha alloy originally developed for elevated temperature use in the range of 1100°F (600°C). However, in certain applications it has been demonstrated that TIMETAL® 1100 can be used at temperatures as high as 1400°F (760°C). This alloy is primarily used in the beta processed (beta worked or beta annealed) condition. TIMETAL® 1100 offers one of the highest combination of strength, creep resistance, fracture toughness and stability of any commercially available titanium alloy. Currently, the main application for this alloy is automotive/motorcycle engine valves.

TABLE 1

CHEMICAL COMPOSITION

ELEMENT	WEIGHT %	
	Min.	Max.
Aluminum	5.5	6.5
Tin	2.4	3.0
Zirconium	3.5	4.5
Molybdenum	0.35	0.50
Silicon	0.35	0.50
Iron		0.03
Nickel		0.02
Oxygen		0.09
Carbon		0.04
Nitrogen		0.03
Residual Elements, Each		0.10
Residuals Elements, Total		0.30
Titanium		Bal.

TABLE 2

PHYSICAL PROPERTIES

PROPERTY	VALUE		
	Temp.	English	SI
Density	RT	0.163 lbs/in ³	4.5 g/cm ³
Beta Transus	-	1860°F	1015°C
Melting (liquidus) point	-	2978°F	1637°C
Thermal Conductivity	RT	4 Btu-ft/h-ft ² -F	7 W/m-K
Specific Heat	RT	0.13 cal/g-K	545 J/kg-K
Resistivity	RT	70μΩin	179 X 10 ⁻⁶ Ωm
Modulus of elasticity	RT	15.5 to 17 X 10 ⁶ psi	107 to 117 GPa
Thermal Expansion Coefficient	RT	4.7 X 10 ⁻⁶ /°F	8.5 X 10 ⁻⁶ /°C

TABLE 3

TYPICAL TENSILE PROPERTIES

Condition	Temperature	Ultimate Tensile Strength ksi (MPa)	0.2% Yield Strength ksi (MPa)	El %	RA %
Mill Anneal (1400°F/1hr)	RT	164 (1131)	155 (1069)	12	26
Beta Anneal + 1400°F/1hr	RT	150 (1034)	134 (924)	4	13
Beta Anneal + 1400°F/1hr	400°F (205°C)	120 (827)	103 (710)	8	16
Beta Anneal + 1400°F/1hr	800°F (425°C)	105 (724)	85 (586)	10	19
Beta Anneal + 1400°F/1hr	1050°F (565°C)	99 (683)	81 (558)	9	22
Beta Anneal + 1400°F/1hr	1200°F (650°C)	90 (621)	77 (531)	10	22
Beta Anneal + 1400°F/1hr	1400°F (760°C)	64 (441)	57 (393)	46	96

TABLE 4

HIGH CYCLE FATIGUE STRENGTH

Temperature	K _t	Fatigue Strength 10 ⁷ Cycles ksi (MPa)
71°F (22°C)	1.0	95 (655)
	3.0	36 (250)
895°F (480°C)	1.0	72 (500)
	3.0	34 (235)

(1) Beta forged and annealed; tested at 30 Hz; R=0.1

TABLE 5

TYPICAL CREEP PROPERTIES FOR STANDARD APPLICATIONS

Temperature	Stress ksi (MPa)	Creep Rate x10 ⁻⁶ / hr	Hours to 0.2% Creep Strain
1050°F (565°C)	40(275)	20-50	30-50
1400°F (760°C)	10(69)	120-185	5-10



TABLE 6

OXIDATION RESISTANCE (IN AIR)

Temperature	Time (hr)	Weight Gain (mg/cm ²)
1472°F(800°C)	24	1.4
1472°F(800°C)	100	3.5

CONTACT INFORMATION

NORTH AMERICA

Hartford, CT	860-627-7051
Toronto, OH	740-537-5600
St. Louis, MO	800-753-1550
Dallas, TX	817-329-5035
Tustin, CA	714-573-1000

EUROPE

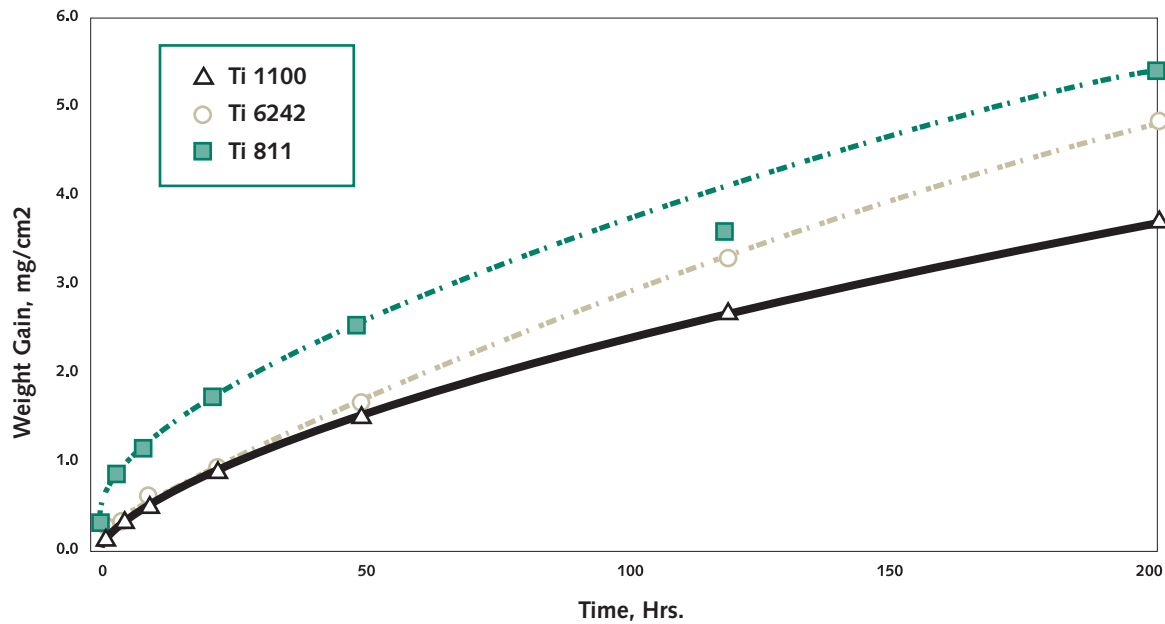
Birmingham, England	44-121-356-1155
Savoie, France	33-4-79-89-73-73
Dusseldorf, Germany	49-211-230-880

TECHNICAL SUPPORT

Henderson, NV	702-566-4416
Birmingham, England	+ 44-121-332-5381

FIGURE 1

OXIDATION RESISTANCE AT 1400°F (760°C) IN AIR



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



FIRST IN TITANIUM WORLDWIDE

