TIMETAL® 50A

COMMERCIALLY PURE TITANIUM

TIMETAL 50A is equivalent to ASTM Grade 2. It is the "workhorse" for industrial applications, having a guaranteed minimum 0.2% yield strength of 40 ksi (275 MPa) and good ductility and formability. *TIMETAL* 50A is used extensively for sea water piping, reactor vessels and heat exchangers throughout the CPI, Petrochemical, Oil & Gas and Naval/Marine markets. It also is ASME approved, has good impact properties at low temperatures, and has excellent resistance to erosion and corrosion by seawater and marine atmospheres.

TIMETAL 50A is typically used in continuous service up to 800°F (425°C) and in intermittent service up to 1000°F (540°C). In addition *TIMETAL* 50A can be easily welded, machined, cold worked, hot worked, and cast.

TABLE 1

CHEMICAL COMPOSITION

ELEMENT	WEIGHT %
	Maximum
Oxygen	0.25
Nitrogen	0.03
Carbon	0.08
Iron	0.30
Hydrogen*	0.015
Residual Elements, each	0.10
Residual Elements, total	0.40
Titanium	Remainder

* Hydrogen content depends on product form.

TABLE 2

PHYSICAL PROPERTIES

PROPERTY	VALUE	
	English	*SI*
Density	0.163 lb in^{-3}	4.51 g cm^{-3}
Beta Transus	1680°F	915°C
Thermal Conductivity	12.60 Btu hr^{-1} ft^{-1} $°F^{-1}$	21.79 W m^{-1} K^{-1}
Electrical Resistivity	21 μΩ•in	0.53 μΩ•m
Magnetic Permeability	Nonmagnetic	
Mean Coefficient of Thermal Expansion		
68-212°F (20-100°C)	4.8 x 10^{-6} in in^{-1} $°F^{-1}$	8.6 x 10^{-6} m m^{-1} $°C^{-1}$
68-572°F (20-300°C)	5.3 x 10^{-6} in in^{-1} $°F^{-1}$	9.5 x 10^{-6} m m^{-1} $°C^{-1}$
68-932°F (20-500°C)	5.4 x 10^{-6} in in^{-1} $°F^{-1}$	9.7 x 10^{-6} m m^{-1} $°C^{-1}$
Elastic Modulus*	15.2-17.4 Msi	105-120 GPa

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

TABLE 3

HEAT TREATMENT

Anneal	*Stress Relieve*
1290°F (700°C) 1 hour / Air Cool	932°F (500°C) 30 mins / Air Cool

TABLE 4

TYPICAL MECHANICAL PROPERTIES

UTS ksi (MPa)	*0.2% YS ksi (MPa)*	*Elongation %*	*Reduction in Area %*	*Bend Radius*
70 (485)	50 (345)	28	57	2.5T

TABLE 5

FATIGUE AND TENSILE PROPERTIES

ROTATING BEND

Condition	Ultimate Tensile Strength ksi (MPa)	Fatigue Limit 10^7 Cycles ksi (MPa)	Fatigue Ratio
Smooth, $K_t = 1$	60 (417)	±34 (232)	0.56
Notched, $K_t = 3$	60 (417)	±22 (154)	0.37

TABLE 6

TYPICAL ELEVATED TEMPERATURE TENSILE PROPERTIES

Test Temperature	0.2% Yield Strength ksi (MPa)	Ultimate Tensile Strength ksi (MPa)	Elongation %
212°F (100°C)	37 (256)	56 (383)	31
392°F (200°C)	28 (192)	41 (280)	37
572°F (300°C)	18 (127)	33 (229)	43
752°F (400°C)	13 (92)	27 (186)	38
842°F (450°C)	11 (74)	26 (178)	34

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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TITANIUM MEMBER

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