

# TIMETAL<sup>®</sup> 35A

## COMMERCIALLY PURE TITANIUM

TIMETAL 35A is equivalent to ASTM Grade 1. It has the highest purity, lowest strength, and best room-temperature ductility and formability of the four ASTM commercially pure grades. TIMETAL 35A should be used where maximum formability is required such as in explosive bonding and plate type heat exchangers. It exhibits excellent corrosion resistance in highly oxidizing to mildly reducing environments, including chlorides.

TIMETAL 35A is typically used in continuous service up to 800°F (425°C) and in intermittent service up to 1000°F (540°C). It also has good impact properties at low temperatures. In addition TIMETAL 35A can be easily welded, machined, cold worked, hot worked, and cast.

TABLE 1

### CHEMICAL COMPOSITION

ELEMENT	WEIGHT %
	<i>Maximum</i>
Oxygen	0.18
Nitrogen	0.03
Carbon	0.08
Iron	0.20
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	
	<i>English</i>	<i>SI</i>
Density	0.163 lb in <sup>-3</sup>	4.51 g cm <sup>-3</sup>
Beta Transus	1640°F	890°C
Thermal Conductivity	12.70 Btu hr <sup>-1</sup> ft <sup>-1</sup> °F <sup>-1</sup>	21.97 W m <sup>-1</sup> K <sup>-1</sup>
Electrical Resistivity	18 μΩ•in	0.45 μΩ•m
Magnetic Permeability	Nonmagnetic	
Mean Coefficient of Thermal Expansion		
68-212°F (20-100°C)	4.8 x 10 <sup>-6</sup> in in <sup>-1</sup> °F <sup>-1</sup>	8.6 x 10 <sup>-6</sup> m m <sup>-1</sup> °C <sup>-1</sup>
68-572°F (20-300°C)	5.3 x 10 <sup>-6</sup> in in <sup>-1</sup> °F <sup>-1</sup>	9.5 x 10 <sup>-6</sup> m m <sup>-1</sup> °C <sup>-1</sup>
68-932°F (20-500°C)	5.4 x 10 <sup>-6</sup> in in <sup>-1</sup> °F <sup>-1</sup>	9.7 x 10 <sup>-6</sup> m m <sup>-1</sup> °C <sup>-1</sup>
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

<i>Anneal</i>	<i>Stress Relieve</i>
1292°F (700°C) 1 hour / Air Cool	932°F (500°C) 30 mins / Air Cool

TABLE 4

### TYPICAL MECHANICAL PROPERTIES

<i>UTS</i> ksi (MPa)	<i>0.2% YS</i> ksi (MPa)	<i>Elongation</i> %	<i>Reduction in Area</i> %	<i>Bend</i> Radius
50 (345)	35 (220)	35	70	2.0T



TABLE 5

FATIGUE AND TENSILE PROPERTIES

ROTATING BEND

Condition	Ultimate Tensile Strength ksi (MPa)	Fatigue Limit 10 <sup>7</sup> Cycles ksi (MPa)	Fatigue Ratio
Smooth, K <sub>t</sub> = 1	51 (354)	±28 (193)	0.55
Notched, K <sub>t</sub> = 3	51 (354)	±18 (123)	0.35

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)	23 (156)	41 (284)	38
392°F (200°C)	12 (85)	32 (219)	40
572°F (300°C)	7 (51)	24 (163)	48
752°F (400°C)	5 (36)	19 (130)	51
842°F (450°C)	4 (31)	17 (117)	49

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](http://www.timet.com)

NORTH AMERICA

Hartford, CT	860-627-7051
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TECHNICAL SUPPORT

Henderson, NV	702-566-4416
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