TIMETAL® 407

Ti-3.9V-0.85Al-0.25Si-0.25Fe

TIMETAL®407 [Ti407] is a TIMET-developed, easily workable alloy that excels in applications requiring resistance to impact, explosive blast, and/or other forms of shock loading. Generally, properties are similar to that of Ti-6Al-4V or Ti-3Al-2.5V alloy. However, in comparison, Ti407 can provide considerable cost savings by being significantly easier to process and machine. It achieves these properties through a combination of high ductility and moderate strength, i.e. an optimum strength/ductility balance for certain applications. Ti407 has been produced in billet, plate, sheet, coil, bar, and wire forms. Metallurgically, it is an alpha/beta alloy.

High Ductility
Impact Resistant
Highly Processable

Table 1

CHEMICAL COMPOSITION

ELEMENT	WEIGHT %	
	Min.	Max.
Vanadium	3.5	4.3
Aluminum	0.55	1.15
Iron	0.15	0.35
Silicon	0.20	0.30
Oxygen	0.13	0.17
Carbon	—	0.05
Nitrogen	—	0.03
Titanium	Remainder	

Table 2

TYPICAL PROPERTIES OF ½" PLATE (STA)

PROPERTY	VALUE	
	English	SI
Density @ 24°C	0.164 lb in^{-3}	4.53 g cm^{-3}
Beta Transus	1635 °F	890 °C
Conductivity @ 24°C	6.53 Btu/ft-h-°F	11.3 W/m-K
Diffusivity @ 24°C	0.44 in^2/min	4.68 mm^2/s
Specific Heat @ 24°C	0.127 Btu/lb-°F	533 J/kg-K
Charpy V-Notch @ 24°C	80 ft-lbs - 55 mils	108 J - 1.4 mm
1/s 800˚C Peak Flow Stress	21 ksi	146 MPa
Machinability V15 (tool life)	2.25x that of Ti64 (153 vs 68 m/min)	

Table 3

HEAT TREATMENT

Solution Heat Treatment	50-100 °F (28-56 °C) below beta transus for a minimum of 30 minutes, water quench or slower cool depending on desired properties (Table 4).
Aging Heat Treatment	900-1000 °F (482-538 °C) for 8 hours, air cool
Mill Anneal	1300 °F (704 °C) for 2 hours, air cool

Table 4

TYPICAL MECHANICAL PROPERTIES

½" rolled plate (STA per Table 3) - Average of Longitudinal & Transverse Orientations

Cooling Rate °F/min (°C/min)	Ultimate Tensile Strength ksi (MPa)	0.2% Yield Strength ksi (MPa)	Elongation % on 4D	Reduction in Area %
WQ: 530 (850)	128 (882)	113 (776)	23	59
OQ: 900 (500)	123 (849)	107 (740)	24	61
FAC: 216 (120)	109 (751)	94 (649)	27	56
AC: 144 (80)	108 (742)	93 (642)	27	58
54 (30)	104 (718)	91 (627)	26	58
18 (10)	103 (707)	91 (626)	26	53

US Patent 10,000,838

POTENTIAL APPLICATIONS

Aerospace	Fasteners	Marine
Medical	Automotive	Industrial

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