



ATI CP Grade 1, ATI CP Grade 2, ATI CP Grade 3, ATI CP Grade 4

Commercially Pure Titanium

(UNS R50250, R50400, R50550, R50700)

INTRODUCTION

ATI 30, CP Grade 1, ATI 40, CP Grade 2, ATI 55, CP Grade 3, ATI 70, CP Grade 4 or Commercially Pure, titanium grades (UNS R50250, R50400, R50550, R50700) are used where high ductility combined with excellent corrosion resistance, moderate strength, and good weldability are desired. The four grade numbers (ATI 30, 40, 55, 70) refer to the approximate minimum yield strengths for each grade. The different grades are characterized by differences in oxygen levels. These three titanium grades may be produced by single melt EB (electron beam) processing, or in a multiple melting practice with a final VAR (vacuum arc remelt). Typical product forms are billet, rolled bar, rod, and drawn wire products for applications such as airframe skin and structural components, cryogenic vessels, heat exchangers, chemical processing equipment, and medical and surgical device applications.

SPECIFICATIONS

- ASTM Grades I, II, III, IV (ATI 30, 40, 55, 70)
- ASTM B 348 - Bars and Billets
- AMS 4921 - Bars, Wire, and Forgings
- ASTM F 67 - Unalloyed Titanium
- ISO 5832-2 - Unalloyed Titanium

PHYSICAL PROPERTIES

Melting Range: 3,000-3,040°F, (1,649 - 1,671°C)

Density: 0.163 lbs/in³; 4.51 gm/cm³

Beta Transus Temperature:

ATI 30 1,630°F ± 25F° (888°C ± 4C°)

ATI 40 1,675°F ± 25F° (913°C ± 4C°)

ATI 55 1,690°F ± 25F° (921°C ± 4C°)

ATI 70 1,740°F ± 25F° (949°C ± 4C°)

HEAT TREATMENT

Commercially pure titanium can be annealed by heating to 1,000 - 1,300°F (538 - 704°C) for 1/2 to 2 hours and air cooling.

Stress relief annealing can be achieved by heating to 1,000 - 1,100°F (538 - 593°C) for 30 minutes followed by air cooling.

HARDNESS

Typical annealed hardness in the annealed condition for ATI CP Grade 2 titanium is approximately Rockwell B80 and for ATI CP Grade 4 titanium about Rockwell B100.

FORGEABILITY/FORMABILITY

Commercially pure titanium is readily finish forged from 600 - 1,200°F (316 - 649°C). Reductions of 25-40% below the Beta



Technical Data Sheet

transus are necessary to obtain optimum properties. At room temperature CP titanium has limited formability.

Temperatures from 400 to 1,000°F (204 - 538°C) are normally used for deep drawing, spinning and other forming operations.

MACHINABILITY

Commercially pure titanium can be machined using practices for austenitic stainless steels using slow speeds, heavy feeds, rigid tooling and large amounts of non-chlorinated cutting fluid.

WELDABILITY

Commercially pure titanium is easily welded if proper precautions are taken to prevent oxygen, nitrogen, and hydrogen contamination. Fusion welding can be done in inert gas filled chambers or using inert gas shielding of the molten weld metal and the adjacent heated zones using a trailing shield. Spot, seam, and flash welding can be performed without resorting to protective atmospheres.

SPECIAL PRECAUTIONS

Commercially pure titanium can be subject to hydrogen contamination during improper pickling and by oxygen, nitrogen, and carbon pickup during forging, heat treating, brazing, etc. This contamination results in a deterioration in ductility which adversely affects notch sensitivity and forming characteristics.

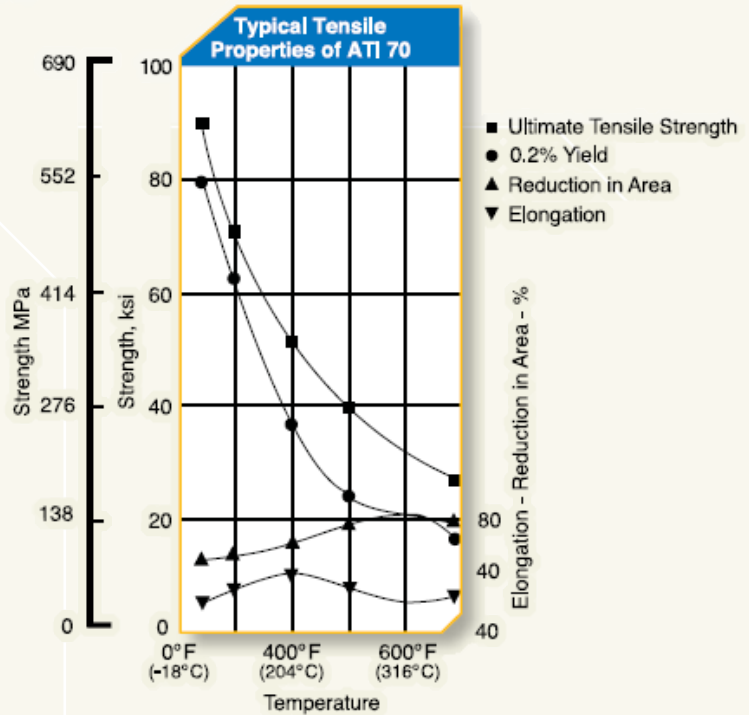
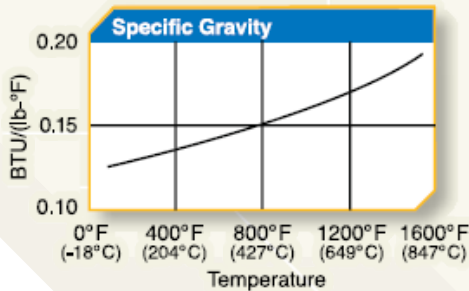
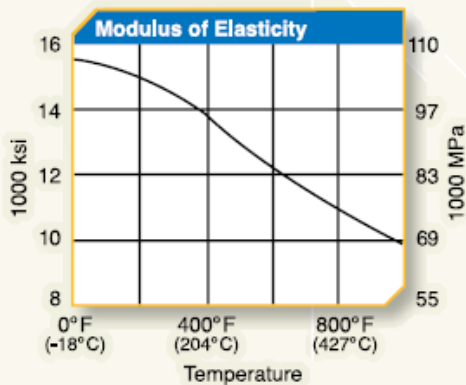
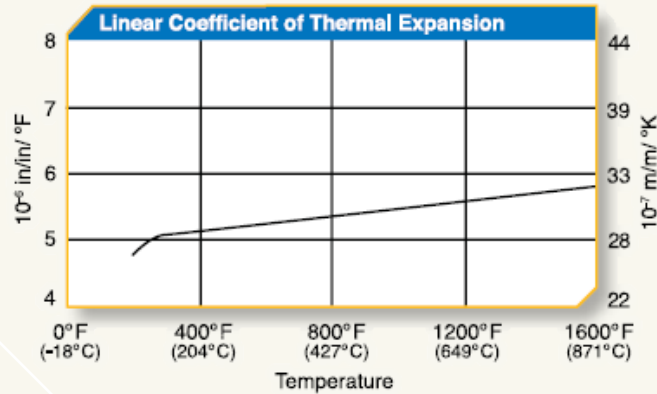
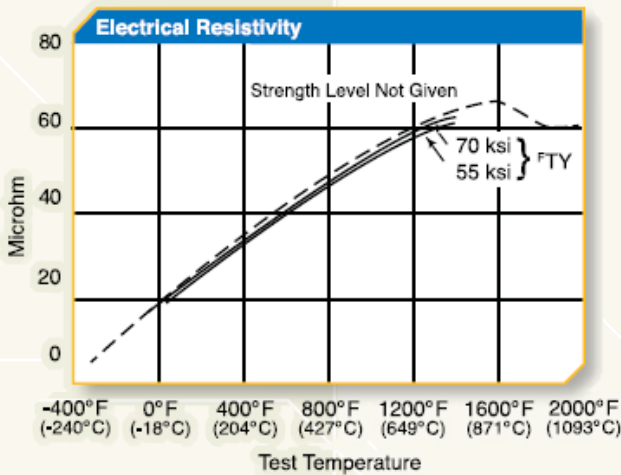


ATI CP Grade 1, ATI CP Grade 2, ATI CP Grade 3, ATI CP Grade 4

Technical Data Sheet

Chemical Composition												
Alvac Grade	ASTM B348 Grade #	Chemistry	N	C	H ^A	H ^B	O	Fe	Pd	Other Elements ^C Each Total		Ti
30	1	Weight %, maximum	0,03	0,10	0,010	0,0125	0,18	0,20	-	0,05	0,30	Bal.
40	2		0,03	0,10	0,010	0,0125	0,25	0,30	-	0,05	0,30	Bal.
55	3		0,05	0,10	0,010	0,0125	0,35	0,30	-	0,05	0,30	Bal.
70	4		0,05	0,10	0,010	0,0125	0,40	0,50	-	0,05	0,30	Bal.

A - Billets only B - Bars only C - Need not be reported.



Data are typical and should not be construed as maximum or minimum values for specification or for final design. Data on any particular piece of material may vary from those herein. U.S. and foreign patents; other patents pending. © 2011 ATI. All rights reserved.

Allegheny Technologies Incorporated
1000 Six PPG Place
Pittsburgh, PA 15222-5479 U.S.A.
www.ATImetals.com