



ASM Aerospace Specification Metals Inc.



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## Titanium Grade 4

**Subcategory:** Metal; Nonferrous Metal; Titanium Alloy; Unalloyed/Modified Titanium

**Close Analogs:** Titanium Grades 1,2,3,4,7,11,and 12 are all considered unalloyed and have similar mechanical properties.

**Key Words:** ASTM Grade 4: UNS R50700, CP titanium, C.P. titanium alloy

Component	Wt. %
C	Max 0.1
Fe	Max 0.5
H	Max 0.015
N	Max 0.05
O	Max 0.4
Ti	99

### Material Notes:

Information provided by Allvac and the references.

**Applications:** Airframe components, cryogenic vessels, heat exchangers, CPI equipment, condenser tubing, pickling baskets.

Physical Properties	Metric	English	Comments
Density	<u>4.51 g/cc</u>	0.163 lb/in <sup>3</sup>	

### Mechanical Properties

Hardness, Brinell	265	265	annealed
Hardness, Knoop	215	215	unwelded sheet
Hardness, Rockwell B	100	100	annealed
Hardness, Rockwell B	23	23	unwelded sheet
Hardness, Rockwell C	23	23	Estimated from Brinell.
Hardness, Vickers	280	280	Estimated from Brinell.
Tensile Strength, Ultimate	<u>550 MPa</u>	79800 psi	

Tensile Strength, Yield	480 - 552 MPa	69600 - 80100 psi	
Elongation at Break	<u>15 %</u>	15 %	
Reduction of Area	<u>30 %</u>	30 %	
Modulus of Elasticity	<u>105 GPa</u>	15200 ksi	In Tension
Compressive Modulus	<u>110 GPa</u>	16000 ksi	
Ultimate Bearing Strength	<u>695 MPa</u>	101000 psi	
Bearing Yield Strength	<u>830 MPa</u>	120000 psi	2% permanent set
Poisson's Ratio	0.37	0.37	
Fatigue Strength	<u>250 MPa</u>	36300 psi	at 1E+7 cycles. $K_t$ (stress concentration factor) = 2.7
Fatigue Strength	<u>290 MPa</u>	42100 psi	at 100,000 cycles; $K_t$ (stress concentration factor) = 2.7
Fatigue Strength	<u>425 MPa</u>	61600 psi	1E+7 cycles, Unnotched
Fatigue Strength	<u>517 MPa</u>	75000 psi	Unnotched 100,00 Cycles
Fracture Toughness	99 - 140 MPa-m <sup>1/2</sup>	90.1 - 127 ksi-in <sup>1/2</sup>	for K(Q) annealed
Shear Modulus	<u>40 GPa</u>	5800 ksi	

### Electrical Properties

Electrical Resistivity	<u>6e-005 ohm-cm</u>	6e-005 ohm-cm
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### Thermal Properties

Heat of Fusion	<u>325 J/g</u>	140 BTU/lb	High Purity Ti.
CTE, linear 20°C	<u>8.6 μm/m-°C</u>	4.78 μin/in-°F	0-100°C
CTE, linear 250°C	<u>9.2 μm/m-°C</u>	5.11 μin/in-°F	Average over the range 0-315°C
CTE, linear 500°C	<u>9.7 μm/m-°C</u>	5.39 μin/in-°F	0-540°C; CTE is higher perpendicular to the c-axis
Specific Heat Capacity	<u>0.53 J/g-°C</u>	0.127 BTU/lb-°F	value at 540°C is 0.67 J/g-°C
Thermal Conductivity	<u>17.2 W/m-K</u>	119 BTU-in/hr-ft <sup>2</sup> -°F	
Melting Point	<u>Max 1660 °C</u>	Max 3020 °F	Liquidus
Liquidus	<u>1660 °C</u>	3020 °F	
Beta Transus	<u>950 °C</u>	1740 °F	

### Optical Properties

Emissivity (0-1)	0.3	0.3	High purity Ti at 710°C
Reflection Coefficient, Visible (0-1)	0.56	0.56	High purity Ti; visible light.

### References for this datasheet.

Some of the values displayed above may have been converted from their original units and/or rounded in order to display the information in a consistent format. Users requiring more precise data for scientific or engineering calculations can click on the property value to see the original value as well as raw conversions to equivalent units. We advise that you only use the original value or one of its raw conversions in your calculations to minimize rounding error.