



ASM Aerospace Specification Metals Inc.

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## Titanium Grade 3, Annealed

**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 3; UNS R50550, CP titanium, C.P. titanium alloy

Component	Wt. %
C	Max 0.1
Fe	Max 0.3
H	Max 0.015
N	Max 0.05
O	Max 0.35
Ti	99.1

### Material Notes:

Information provided by Allvac and the references.

**Applications:** Airframe skin, heat exchangers, cryogenic vessels, components for CPI equipment, condenser tubing, exhaust pipe shrouds. Sample was annealed 2 hr at 700°C.

Physical Properties	Metric	English	Comments
Density	<u>4.5 g/cc</u>	0.163 lb/in <sup>3</sup>	

### Mechanical Properties

Hardness, Brinell	266	266	Estimated from Rockwell C.
Hardness, Knoop	289	289	Estimated from Rockwell C.
Hardness, Rockwell C	26	26	
Hardness, Vickers	280	280	Estimated from Rockwell C.
Tensile Strength, Ultimate	<u>520 MPa</u>	75400 psi	
Tensile Strength, Yield	<u>450 MPa</u>	65300 psi	

Elongation at Break	<u>25 %</u>	25 %	
Modulus of Elasticity	<u>104 GPa</u>	15100 ksi	in tension.
Notched Tensile Strength	<u>790 MPa</u>	115000 psi	$K_t$ (stress concentration factor) = 3.0
Ultimate Bearing Strength	<u>920 MPa</u>	133000 psi	
Bearing Yield Strength	<u>650 MPa</u>	94300 psi	
Poisson's Ratio	0.34	0.34	
Charpy Impact	<u>27 J</u>	19.9 ft-lb	V-notch
Fatigue Strength	<u>250 MPa</u>	36300 psi	at 1E+7 cycles. $K_t$ (stress concentration factor) = 2.7
Fatigue Strength	<u>340 MPa</u>	49300 psi	1E+7 cycles, Unnotched
Shear Modulus	<u>39 GPa</u>	5660 ksi	

### Electrical Properties

Electrical Resistivity	<u>5.4e-005 ohm-cm</u>	5.4e-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 <math>\mu\text{m}/\text{m}\cdot^\circ\text{C}</math></u>	4.78 $\mu\text{in}/\text{in}\cdot^\circ\text{F}$	20-93°C
CTE, linear 250°C	<u>9.2 <math>\mu\text{m}/\text{m}\cdot^\circ\text{C}</math></u>	5.11 $\mu\text{in}/\text{in}\cdot^\circ\text{F}$	Unspecified heat treatment. Average over the range 0-315°C
Specific Heat Capacity	<u>0.523 J/g-°C</u>	0.125 BTU/lb-°F	
Thermal Conductivity	<u>16.4 W/m-K</u>	114 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>920 °C</u>	1690 °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.