

## ATI Allvac® 718Plus™ Nickel Superalloy

Category : Metal , Nonferrous Metal , Nickel Alloy , Superalloy

### Material Notes:

Allvac 718Plus alloy (UNS N07818) is a precipitation hardened nickel-base material that exhibits high temperature tensile strength and stress rupture performance. This alloy is designed to have the high temperature capability and thermal stability of Waspaloy alloy while retaining the processing characteristics of 718 alloy. It is double vacuum melted (VIM/ESR/VAR). This VIM/VAR process ensures excellent microcleanliness and tight compositional control. Triple melting, with electroslag remelting between the VIM and VAR operations, minimizes the possibility of macrosegregation, increases microcleanliness, and is preferred for premium quality jet engine rotating component applications. 718Plus alloy has at least a 100°F (55°C) operating temperature advantage over 718 alloy. 718Plus alloy also has advantages over Waspaloy and other higher temperature capable, nickel-base alloys due to its higher strength, superior formability, better wear resistance, and a resistance to weld cracking. 718Plus alloy is a lower cost option than Waspaloy or Rene 41 alloy due to its lower intrinsic raw materials cost and improved hot workability which provides higher material yields, resulting in a lower cost finished part. 718Plus alloy is available in all product forms: ingot, billet, block, forged round bar, hot-rolled shapes and rectangles, bar, rod, wire, plate, sheet, strip, and castings. Information provided by Allegheny Technologies

Order this product through the following link:

[http://www.lookpolymers.com/polymer\\_ATI-Allvac-718Plus-Nickel-Superalloy.php](http://www.lookpolymers.com/polymer_ATI-Allvac-718Plus-Nickel-Superalloy.php)

Physical Properties	Metric	English	Comments
Density	8.25 g/cc	0.298 lb/in <sup>3</sup>	

Mechanical Properties	Metric	English	Comments
Hardness, Rockwell C	25 - 35	25 - 35	solution heat treated depending on quench rate
	42 - 48	42 - 48	fully aged condition
Tensile Strength, Ultimate	1480 MPa	215000 psi	
	1380 MPa	200000 psi	
	@Temperature 427 °C	@Temperature 800 °F	
Tensile Strength, Yield	1450 MPa	210000 psi	
	@Temperature 204 °C	@Temperature 400 °F	
Tensile Strength, Yield	1170 MPa	170000 psi	
	1030 MPa	150000 psi	
	@Temperature 427 °C	@Temperature 800 °F	
Tensile Strength, Yield	1100 MPa	160000 psi	
	@Temperature 204 °C	@Temperature 400 °F	
Elongation at Break	25 %	25 %	

Mechanical Properties	Metric	English	Comments
CTE, linear	12.3 $\mu\text{m}/\text{m}\cdot^\circ\text{C}$	6.85 $\mu\text{in}/\text{in}\cdot^\circ\text{F}$	
	@Temperature 100 $^\circ\text{C}$	@Temperature 212 $^\circ\text{F}$	
	13.1 $\mu\text{m}/\text{m}\cdot^\circ\text{C}$	7.30 $\mu\text{in}/\text{in}\cdot^\circ\text{F}$	
	@Temperature 250 $^\circ\text{C}$	@Temperature 482 $^\circ\text{F}$	
	13.86 $\mu\text{m}/\text{m}\cdot^\circ\text{C}$	7.700 $\mu\text{in}/\text{in}\cdot^\circ\text{F}$	
	@Temperature 500 $^\circ\text{C}$	@Temperature 932 $^\circ\text{F}$	
Specific Heat Capacity	16.74 $\mu\text{m}/\text{m}\cdot^\circ\text{C}$	9.300 $\mu\text{in}/\text{in}\cdot^\circ\text{F}$	
	@Temperature 900 $^\circ\text{C}$	@Temperature 1650 $^\circ\text{F}$	
	0.520 $\text{J}/\text{g}\cdot^\circ\text{C}$	0.124 $\text{BTU}/\text{lb}\cdot^\circ\text{F}$	
	@Temperature 260 $^\circ\text{C}$	@Temperature 500 $^\circ\text{F}$	
	0.700 $\text{J}/\text{g}\cdot^\circ\text{C}$	0.167 $\text{BTU}/\text{lb}\cdot^\circ\text{F}$	
	@Temperature 538 $^\circ\text{C}$	@Temperature 1000 $^\circ\text{F}$	
Thermal Conductivity	0.725 $\text{J}/\text{g}\cdot^\circ\text{C}$	0.173 $\text{BTU}/\text{lb}\cdot^\circ\text{F}$	
	@Temperature 399 $^\circ\text{C}$	@Temperature 750 $^\circ\text{F}$	
	0.900 $\text{J}/\text{g}\cdot^\circ\text{C}$	0.215 $\text{BTU}/\text{lb}\cdot^\circ\text{F}$	
	@Temperature 468 $^\circ\text{C}$	@Temperature 875 $^\circ\text{F}$	
Thermal Conductivity	13.7 $\text{W}/\text{m}\cdot\text{K}$	95.0 $\text{BTU}\cdot\text{in}/\text{hr}\cdot\text{ft}^2\cdot^\circ\text{F}$	
	@Temperature 260 $^\circ\text{C}$	@Temperature 500 $^\circ\text{F}$	
	18.0 $\text{W}/\text{m}\cdot\text{K}$	125 $\text{BTU}\cdot\text{in}/\text{hr}\cdot\text{ft}^2\cdot^\circ\text{F}$	
	@Temperature 538 $^\circ\text{C}$	@Temperature 1000 $^\circ\text{F}$	
	23.8 $\text{W}/\text{m}\cdot\text{K}$	165 $\text{BTU}\cdot\text{in}/\text{hr}\cdot\text{ft}^2\cdot^\circ\text{F}$	
	@Temperature 816 $^\circ\text{C}$	@Temperature 1500 $^\circ\text{F}$	
	26.7 $\text{W}/\text{m}\cdot\text{K}$	185 $\text{BTU}\cdot\text{in}/\text{hr}\cdot\text{ft}^2\cdot^\circ\text{F}$	
	@Temperature 1090 $^\circ\text{C}$	@Temperature 2000 $^\circ\text{F}$	
Melting Point	1260 - 1343 $^\circ\text{C}$	2300 - 2449 $^\circ\text{F}$	
Solidus	1260 $^\circ\text{C}$	2300 $^\circ\text{F}$	
Liquidus	1343 $^\circ\text{C}$	2449 $^\circ\text{F}$	

Component Elements Properties	Metric	English	Comments
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Aluminum, Al Component Elements Properties	Metric 1.2 - 1.8 %	English 1.2 - 1.8 %	Comments
Boron, B	<= 0.0080 %	<= 0.0080 %	
Carbon, C	<= 0.060 %	<= 0.060 %	
Chromium, Cr	17 - 21 %	17 - 21 %	
Cobalt, Co	8.0 - 10 %	8.0 - 10 %	
Iron, Fe	8.0 - 10 %	8.0 - 10 %	
Manganese, Mn	<= 0.35 %	<= 0.35 %	
Molybdenum, Mo	2.5 - 3.1 %	2.5 - 3.1 %	
Nickel, Ni	45.002 - 57.55 %	45.002 - 57.55 %	
Niobium, Nb (Columbium, Cb)	4.75 - 5.8 %	4.75 - 5.8 %	
Phosphorous, P	<= 0.020 %	<= 0.020 %	
Silicon, Si	<= 0.35 %	<= 0.35 %	
Sulfur, S	<= 0.010 %	<= 0.010 %	
Titanium, Ti	0.50 - 1.0 %	0.50 - 1.0 %	
Tungsten, W	0.50 - 1.5 %	0.50 - 1.5 %	

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