

PASCALLOY™ HIGH-STRENGTH NON-MAGNETIC SUPERALLOY

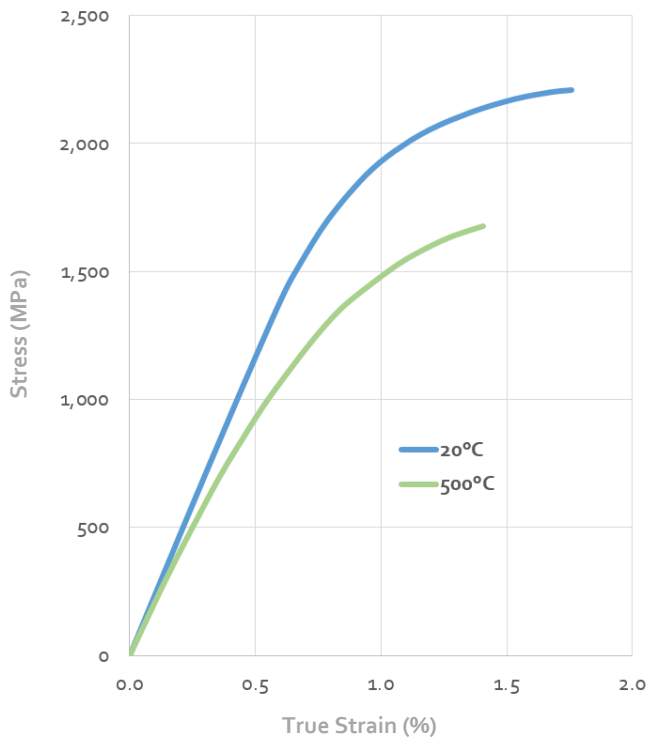


FIG 1. The room temperature (20°C) and high temperature (500°C) stress strain plots for Pascalloy™ aged to the hardest condition.

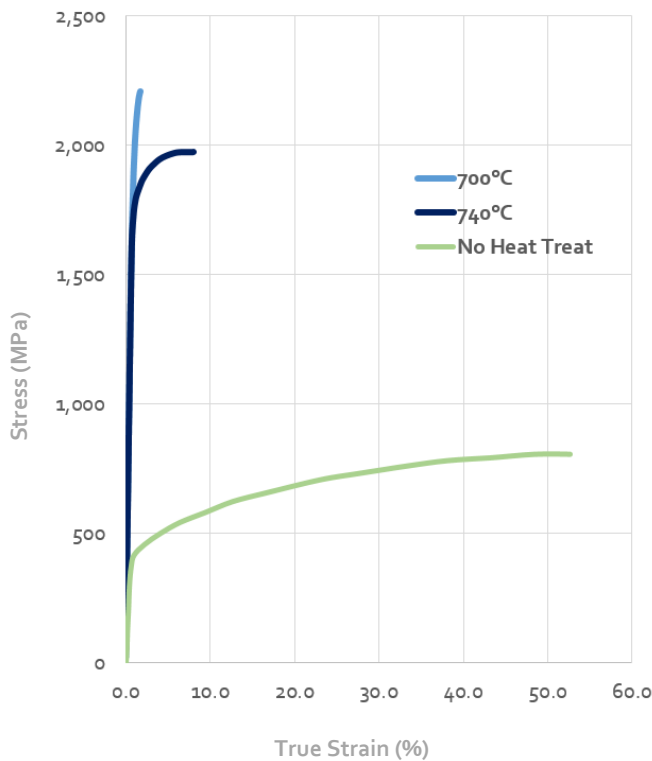


FIG 2. The room temperature (20°C) stress strain plots for Pascalloy™ aged at both 700°C and 740°C compared to no heat treat (aged two hours followed by air cooling).

Alloy Overview

Pascalloy™ is a high strength non-magnetic superalloy with excellent corrosion resistance. The alloy is heat treatable to a wide variety of conditions. Prior to heat treatment the material is ductile, showing elongation greater than 50% and a UTS of ~800 MPa (~116 ksi). Heat treatment can provide any intermediate strength and hardness up to a maximum of ~2,200 MPa (~319 ksi) and 60 HRC respectively. Pascalloy is a domestically manufactured alloy with fine-tuned composition, hot/cold working, aging and heat treatment to ensure the best mechanical properties. Pascalloy™ is available without a minimum quantity requirement to benefit the research community. Stocked material is available in both the heat treated condition for the highest hardness and strength, as well as in the soft condition.

Physical Properties

Density	7.75 g/cc [0.280 lb/in <sup>3</sup> ]
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Mechanical Properties<sup>†</sup>

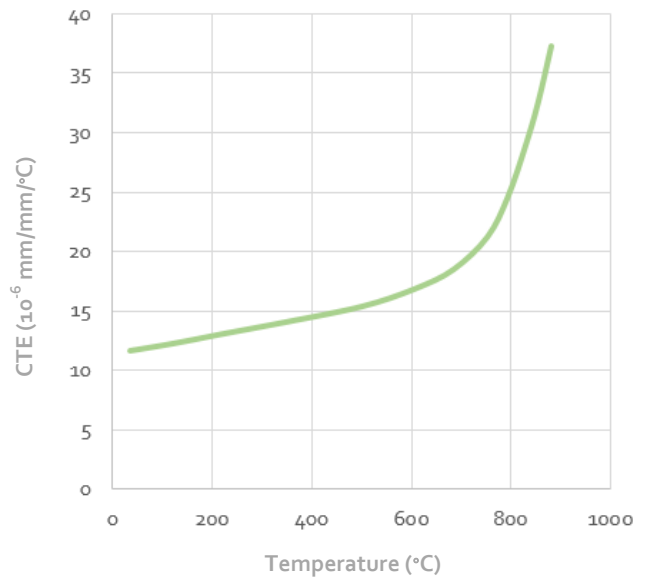
Hardness, Rockwell C	58-60
Tensile Strength, Ultimate	2,210 MPa [320,500 psi] @ 20°C (68°F)
	1,660 MPa [240,800 psi] @ 500°C (932°F)
Tensile Strength, Yield	1,960 MPa [284,300 psi] @ 20°C (68°F) 0.2 % ε
	1,450 MPa [210,300 psi] @ 500°C (932°F) 0.2 % ε
Elongation at Break	1.75% @ 20°C
	1.40% @ 500°C
Poisson's Ratio	0.294
Modulus of Elasticity	230 GPa (3.36×10 <sup>7</sup> psi) @ 20°C (68°F)
	193 GPa (2.80×10 <sup>7</sup> psi) @ 500°C (932°F)
Bulk Modulus	185 GPa (2.68×10 <sup>7</sup> psi)
Shear Modulus	88 GPa (1.28×10 <sup>7</sup> psi)

Composition (Weight %)

Ni	Bal.
Cr	39-41
Al	3.3-3.8

<sup>†</sup>For RT full-hard condition unless otherwise specified.

Electrical and Magnetic Properties	
Magnetic Susceptibility	$4 \times 10^{-8} \text{ m}^3/\text{kg}$ (@ 300 K) $1 \times 10^{-7} \text{ m}^3/\text{kg}$ (@ 4 K)
Electrical Resistivity	$8.0 \times 10^{-7} \Omega\text{m}$ (@ 300 K) $6.4 \times 10^{-7} \Omega\text{m}$ (@ 4.2 K)
Thermal Properties	
CTE, linear	$12.5 \mu\text{m}/\text{m}\cdot^\circ\text{C}$ @ Temp 30-200°C
	$13.1 \mu\text{m}/\text{m}\cdot^\circ\text{C}$ @ Temp 30-400°C
	$15.2 \mu\text{m}/\text{m}\cdot^\circ\text{C}$ @ Temp 30-800°C
	$17.1 \mu\text{m}/\text{m}\cdot^\circ\text{C}$ @ Temp 30-900°C



Selected Cryogenic Mechanical Data					
T (K)	$\mu$ (GPa)	K (GPa)	$\lambda$ (GPa)	E (GPa)	$\nu$
300	88.00	185.14	126.22	228.74	0.294
275	88.90	185.75	126.48	230.01	0.294
250	89.42	186.04	126.43	231.22	0.293
225	89.91	186.30	126.36	232.35	0.292
200	90.39	186.36	126.10	233.43	0.291
175	90.87	186.72	126.14	234.56	0.291
150	91.32	186.84	125.96	235.58	0.290
125	91.75	186.71	125.54	236.51	0.289
100	92.15	186.46	125.03	237.35	0.288
75	92.46	186.58	124.94	238.06	0.287
50	92.69	186.61	124.82	238.57	0.287

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