Haynes HastelloyÂ® S alloy, flat products, solution heat-treated at 760Â°C (1400Â°F), aged 16000 hours

Category : Metal , Nonferrous Metal , Nickel Alloy , Superalloy

Material Notes:

Nickel-based, high temperature alloy. Excellent thermal stability, low thermal expansion, excellent oxidation resistance to 1093Â°C, good high temperature and thermal fatigue strength. Applications include seal rings in gas turbine engines, and severe cyclical heating conditions where it retains strength, ductility, and integrity.Data provided by the manufacturer, Haynes International, Inc.

Order this product through the following link:
http://www.lookpolymers.com/polymer_Haynes-Hastelloy-S-alloy-flat-products-solution-heat-treated-at-760C-1400F-aged-16000-hours.php

Physical Properties	Metric	English	Comments
Density	8.75 g/cc	0.316 lb/inÂ³	

Mechanical Properties	Metric	English	Comments
Hardness, Rockwell A	54 @Thickness 1.45 mm	54 @Thickness 0.0571 in	
	57 @Thickness 12.7 mm	57 @Thickness 0.500 in	
Tensile Strength, Ultimate	879 MPa @Thickness 12.7 mm	127000 psi @Thickness 0.500 in	
	885 MPa @Thickness 1.45 mm	128000 psi @Thickness 0.0571 in	
Tensile Strength, Yield	372 MPa @Strain 0.200 %, Thickness 12.7 mm	54000 psi @Strain 0.200 %, Thickness 0.500 in	
	432 MPa @Strain 0.200 %, Thickness 1.45 mm	62700 psi @Strain 0.200 %, Thickness 0.0571 in	
Elongation at Break	47 % @Thickness 12.7 mm	47 % @Thickness 0.500 in	in 50.8 mm
	52 % @Thickness 1.45 mm	52 % @Thickness 0.0571 in	in 50.8 mm
Modulus of Elasticity	132 GPa @Temperature 1093	19100 ksi @Temperature 1999	Heat treated at 1066Â°C, air cooled

Mechanical Properties	Metric	English	Comments
	151 GPa @Temperature 927 Â°C	21900 ksi @Temperature 1700 Â°F	Heat treated at 1066Â°C, air cooled
	161 GPa @Temperature 813 Â°C	23400 ksi @Temperature 1500 Â°F	Heat treated at 1066Â°C, air cooled
	166 GPa @Temperature 760 Â°C	24100 ksi @Temperature 1400 Â°F	Heat treated at 1066Â°C, air cooled
	174 GPa @Temperature 649 Â°C	25200 ksi @Temperature 1200 Â°F	Heat treated at 1066Â°C, air cooled
	182 GPa @Temperature 538 Â°C	26400 ksi @Temperature 1000 Â°F	Heat treated at 1066Â°C, air cooled
	194 GPa @Temperature 357 Â°C	28100 ksi @Temperature 675 Â°F	Heat treated at 1066Â°C, air cooled
	212 GPa @Temperature 24.0 Â°C	30700 ksi @Temperature 75.2 Â°F	
Charpy Impact	190 J	140 ft-lb	V Notch; plate

Thermal Properties	Metric	English	Comments
CTE, linear	11.5 Âµm/m-Â°C @Temperature 20.0 - 93.0 Â°C	6.39 Âµin/in-Â°F @Temperature 68.0 - 199 Â°F	
	12.2 Âµm/m-Â°C @Temperature 20.0 - 204 Â°C	6.78 Âµin/in-Â°F @Temperature 68.0 - 399 Â°F	
	12.8 Âµm/m-Â°C @Temperature 20.0 - 316 Â°C	7.11 Âµin/in-Â°F @Temperature 68.0 - 601 Â°F	
	13.1 Âµm/m-Â°C @Temperature 20.0 - 427 Â°C	7.28 Âµin/in-Â°F @Temperature 68.0 - 801 Â°F	
	13.3 Âµm/m-Â°C	7.39 Âµin/in-Â°F	

Thermal Properties	Metric	English	Comments
	@Temperature 20.0 - 538 Â°C	@Temperature 68.0 - 1000 Â°F	
	14.4 Âµm/m-Â°C @Temperature 20.0 - 760 Â°C	8.00 Âµin/in-Â°F @Temperature 68.0 - 1400 Â°F	
	14.9 Âµm/m-Â°C @Temperature 20.0 - 871 Â°C	8.28 Âµin/in-Â°F @Temperature 68.0 - 1600 Â°F	
	15.5 Âµm/m-Â°C @Temperature 20.0 - 982 Â°C	8.61 Âµin/in-Â°F @Temperature 68.0 - 1800 Â°F	
	16.0 Âµm/m-Â°C @Temperature 20.0 - 1093 Â°C	8.89 Âµin/in-Â°F @Temperature 68.0 - 1999 Â°F	
Specific Heat Capacity	0.398 J/g-Â°C @Temperature 0.000 Â°C	0.0951 BTU/lb-Â°F @Temperature 32.0 Â°F	
	0.414 J/g-Â°C @Temperature 50.0 Â°C	0.0989 BTU/lb-Â°F @Temperature 122 Â°F	
	0.440 J/g-Â°C @Temperature 150 Â°C	0.105 BTU/lb-Â°F @Temperature 302 Â°F	
	0.456 J/g-Â°C @Temperature 250 Â°C	0.109 BTU/lb-Â°F @Temperature 482 Â°F	
	0.473 J/g-Â°C @Temperature 350 Â°C	0.113 BTU/lb-Â°F @Temperature 662 Â°F	
	0.481 J/g-Â°C @Temperature 450 Â°C	0.115 BTU/lb-Â°F @Temperature 842 Â°F	
	0.494 J/g-Â°C @Temperature 550 Â°C	0.118 BTU/lb-Â°F @Temperature 1020 Â°F	
	0.502 J/g-Â°C @Temperature 650 Â°C	0.120 BTU/lb-Â°F @Temperature 1200 Â°F	
	0.590 J/g-Â°C	0.141 BTU/lb-Â°F @Temperature 1470	

Thermal Properties	Metric	English	Comments
	@Temperature 800 Â°C	Â°F	
	0.594 J/g-Â°C @Temperature 850 Â°C	0.142 BTU/lb-Â°F @Temperature 1560 Â°F	
	0.594 J/g-Â°C @Temperature 900 Â°C	0.142 BTU/lb-Â°F @Temperature 1650 Â°F	
	0.594 J/g-Â°C @Temperature 700 Â°C	0.142 BTU/lb-Â°F @Temperature 1290 Â°F	
	0.594 J/g-Â°C @Temperature 750 Â°C	0.142 BTU/lb-Â°F @Temperature 1380 Â°F	
	0.598 J/g-Â°C @Temperature 950 Â°C	0.143 BTU/lb-Â°F @Temperature 1740 Â°F	
	0.598 J/g-Â°C @Temperature 1000 Â°C	0.143 BTU/lb-Â°F @Temperature 1830 Â°F	
	0.598 J/g-Â°C @Temperature 1050 Â°C	0.143 BTU/lb-Â°F @Temperature 1920 Â°F	
	0.603 J/g-Â°C @Temperature 1100 Â°C	0.144 BTU/lb-Â°F @Temperature 2010 Â°F	
Thermal Conductivity	14.0 W/m-K @Temperature 200 Â°C	97.2 BTU-in/hr-ftÂ²-Â°F @Temperature 392 Â°F	
	16.1 W/m-K @Temperature 300 Â°C	112 BTU-in/hr-ftÂ²-Â°F @Temperature 572 Â°F	
	17.9 W/m-K @Temperature 400 Â°C	124 BTU-in/hr-ftÂ²-Â°F @Temperature 752 Â°F	
	19.5 W/m-K @Temperature 500 Â°C	135 BTU-in/hr-ftÂ²-Â°F @Temperature 932 Â°F	
	21.0 W/m-K	146 BTU-in/hr-ftÂ²-Â°F @Temperature 1110	

Thermal Properties	Metric	English	Comments
	@Temperature 600 Â°C	Â°F	
	26.1 W/m-K @Temperature 700 Â°C	181 BTU-in/hr-ftÂ²-Â°F @Temperature 1290 Â°F	
	26.1 W/m-K @Temperature 800 Â°C	181 BTU-in/hr-ftÂ²-Â°F @Temperature 1470 Â°F	
	26.1 W/m-K @Temperature 900 Â°C	181 BTU-in/hr-ftÂ²-Â°F @Temperature 1650 Â°F	
	27.1 W/m-K @Temperature 950 Â°C	188 BTU-in/hr-ftÂ²-Â°F @Temperature 1740 Â°F	
	28.0 W/m-K @Temperature 1000 Â°C	194 BTU-in/hr-ftÂ²-Â°F @Temperature 1830 Â°F	
Melting Point	1335 - 1380 Â°C	2435 - 2520 Â°F	
Solidus	1335 Â°C	2435 Â°F	
Liquidus	1380 Â°C	2520 Â°F	
Maximum Service Temperature, Air	1093 Â°C	1999 Â°F	

Component Elements Properties	Metric	English	Comments
Aluminum, Al	0.10 - 0.50 %	0.10 - 0.50 %	
Boron, B	<= 0.015 %	<= 0.015 %	
Carbon, C	<= 0.020 %	<= 0.020 %	
Chromium, Cr	14.5 - 17 %	14.5 - 17 %	
Cobalt, Co	<= 2.0 %	<= 2.0 %	
Copper, Cu	<= 0.35 %	<= 0.35 %	
Iron, Fe	<= 3.0 %	<= 3.0 %	
Lanthanum, La	0.010 - 0.10 %	0.010 - 0.10 %	
Manganese, Mn	0.30 - 1.0 %	0.30 - 1.0 %	
Molybdenum, Mo	14 - 16.5 %	14 - 16.5 %	
Nickel, Ni	67 %	67 %	

Component Elements Properties	Metric	English	Comments
Electrical Properties	**Metric**	**English**	**Comments**
Electrical Resistivity	0.000128 ohm-cm @Temperature 25.0 Â°C	0.000128 ohm-cm @Temperature 77.0 Â°F	specimen aged 16000 hours at 650Â°C (1200Â°F)

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