

Haynes R-41 alloy,

Category : Metal , Nonferrous Metal , Nickel Alloy , Superalloy

Material Notes:

Vacuum melted, exceptionally high strength at temperature between 649-982Â°C. Precipitation-hardening type, strength developed by various solutioning and aging heat treatments. Applications include afterburner parts and nozzle diaphragm partitions in current gas turbine engines. Formed with success on drop-hammers, expanding mandrels and stretch formers. Data provided by the manufacturer, Haynes International, Inc.

Order this product through the following link:

http://www.lookpolymers.com/polymer_Haynes-R-41-alloy.php

Physical Properties	Metric	English	Comments
Density	8.25 g/cc	0.298 lb/inÂ³	

Mechanical Properties	Metric	English	Comments
Hardness, Brinell	360 @Temperature 760 Â°C	360 @Temperature 1400 Â°F	Converted from Rockwell C hardness (aged)
Hardness, Knoop	392 @Temperature 760 Â°C	392 @Temperature 1400 Â°F	Converted from Rockwell C hardness (aged)
Hardness, Rockwell B	86 @Temperature 760 Â°C	86 @Temperature 1400 Â°F	annealed
Hardness, Rockwell C	39 @Temperature 760 Â°C	39 @Temperature 1400 Â°F	aged
Hardness, Vickers	378 @Temperature 760 Â°C	378 @Temperature 1400 Â°F	Converted from Rockwell C hardness (aged)
Tensile Strength, Ultimate	952 MPa @Temperature 760 Â°C	138000 psi @Temperature 1400 Â°F	
Tensile Strength, Yield	795 MPa @Strain 0.200 %, Temperature 760 Â°C	115000 psi @Strain 0.200 %, Temperature 1400 Â°F	
Elongation at Break	5.0 % @Temperature 760 Â°C	5.0 % @Temperature 1400 Â°F	in 50.8 mm

Mechanical Properties	Metric	English	Comments
Modulus of Elasticity	156 GPa	22500 ksi	
	@Temperature 927 Â°C	@Temperature 1700 Â°F	
	160 GPa	23200 ksi	
	@Temperature 871 Â°C	@Temperature 1600 Â°F	
	163 GPa	23600 ksi	
	@Temperature 843 Â°C	@Temperature 1550 Â°F	
	166 GPa	24100 ksi	
	@Temperature 816 Â°C	@Temperature 1500 Â°F	
	171 GPa	24800 ksi	
	@Temperature 760 Â°C	@Temperature 1400 Â°F	
	178 GPa	25800 ksi	
	@Temperature 677 Â°C	@Temperature 1250 Â°F	
	179 GPa	26000 ksi	
	@Temperature 649 Â°C	@Temperature 1200 Â°F	
	182 GPa	26400 ksi	
	@Temperature 593 Â°C	@Temperature 1100 Â°F	
	188 GPa	27300 ksi	
	@Temperature 538 Â°C	@Temperature 1000 Â°F	
	190 GPa	27600 ksi	
	@Temperature 482 Â°C	@Temperature 900 Â°F	
	198 GPa	28700 ksi	
	@Temperature 371 Â°C	@Temperature 700 Â°F	
	204 GPa	29600 ksi	
	@Temperature 260 Â°C	@Temperature 500 Â°F	
	213 GPa	30900 ksi	
	@Temperature 149 Â°C	@Temperature 300 Â°F	

Mechanical Properties	218 GPa Metric	31600 ksi English	Comments
	@Temperature 27.0 Â°C	@Temperature 80.6 Â°F	
Poissons Ratio	0.31	0.31	
	@Temperature 149 Â°C	@Temperature 300 Â°F	
	0.31	0.31	
	@Temperature 27.0 Â°C	@Temperature 80.6 Â°F	
	0.32	0.32	
	@Temperature 482 Â°C	@Temperature 900 Â°F	
	0.32	0.32	
	@Temperature 371 Â°C	@Temperature 700 Â°F	
	0.32	0.32	
	@Temperature 260 Â°C	@Temperature 500 Â°F	
	0.33	0.33	
	@Temperature 760 Â°C	@Temperature 1400 Â°F	
	0.33	0.33	
	@Temperature 677 Â°C	@Temperature 1250 Â°F	
	0.33	0.33	
	@Temperature 649 Â°C	@Temperature 1200 Â°F	
	0.34	0.34	
	@Temperature 843 Â°C	@Temperature 1550 Â°F	
	0.35	0.35	
	@Temperature 927 Â°C	@Temperature 1700 Â°F	
Shear Modulus	55.0 GPa	7980 ksi	
	@Temperature 927 Â°C	@Temperature 1700 Â°F	
	61.0 GPa	8850 ksi	
	@Temperature 843 Â°C	@Temperature 1550 Â°F	
	64.0 GPa	9280 ksi	

Mechanical Properties	Metric	English	Comments
	@Temperature 760 Â°C	@Temperature 1400 Â°F	
	67.0 GPa	9720 ksi	
	@Temperature 677 Â°C	@Temperature 1250 Â°F	
	69.0 GPa	10000 ksi	
	@Temperature 593 Â°C	@Temperature 1100 Â°F	
	72.0 GPa	10400 ksi	
	@Temperature 482 Â°C	@Temperature 900 Â°F	
	75.0 GPa	10900 ksi	
	@Temperature 371 Â°C	@Temperature 700 Â°F	
	77.0 GPa	11200 ksi	
	@Temperature 260 Â°C	@Temperature 500 Â°F	
	81.0 GPa	11700 ksi	
	@Temperature 149 Â°C	@Temperature 300 Â°F	
	83.0 GPa	12000 ksi	
	@Temperature 27.0 Â°C	@Temperature 80.6 Â°F	

Thermal Properties	Metric	English	Comments
CTE, linear	13.5 Âµm/m-Â°C	7.50 Âµin/in-Â°F	
	@Temperature 21.0 - 538 Â°C	@Temperature 69.8 - 1000 Â°F	
	14.0 Âµm/m-Â°C	7.78 Âµin/in-Â°F	
	@Temperature 21.0 - 649 Â°C	@Temperature 69.8 - 1200 Â°F	
	14.8 Âµm/m-Â°C	8.22 Âµin/in-Â°F	
	@Temperature 21.0 - 760 Â°C	@Temperature 69.8 - 1400 Â°F	
	15.2 Âµm/m-Â°C	8.44 Âµin/in-Â°F	
	@Temperature 21.0 - 871 Â°C	@Temperature 69.8 - 1600 Â°F	
	16.3 Âµm/m-Â°C	9.06 Âµin/in-Â°F	
	@Temperature 21.0 - 927 Â°C	@Temperature 69.8 - 1700 Â°F	

Thermal Properties	16.8 Åum/m-Å°C Metric	9.33 Åuin/in-Å°F English	Comments
	@Temperature 21.0 - 982 Å°C	@Temperature 69.8 - 1800 Å°F	
Specific Heat Capacity	0.452 J/g-Å°C @Temperature 21.0 Å°C	0.108 BTU/lb-Å°F @Temperature 69.8 Å°F	
Thermal Conductivity	11.5 W/m-K @Temperature 149 Å°C	79.8 BTU-in/hr-ftÅ²-Å°F @Temperature 300 Å°F	
	12.5 W/m-K @Temperature 204 Å°C	86.8 BTU-in/hr-ftÅ²-Å°F @Temperature 399 Å°F	
	13.6 W/m-K @Temperature 260 Å°C	94.4 BTU-in/hr-ftÅ²-Å°F @Temperature 500 Å°F	
	14.7 W/m-K @Temperature 316 Å°C	102 BTU-in/hr-ftÅ²-Å°F @Temperature 601 Å°F	
	16.8 W/m-K @Temperature 427 Å°C	117 BTU-in/hr-ftÅ²-Å°F @Temperature 801 Å°F	
	18.8 W/m-K @Temperature 538 Å°C	130 BTU-in/hr-ftÅ²-Å°F @Temperature 1000 Å°F	
	20.0 W/m-K @Temperature 593 Å°C	139 BTU-in/hr-ftÅ²-Å°F @Temperature 1100 Å°F	
	21.0 W/m-K @Temperature 644 Å°C	146 BTU-in/hr-ftÅ²-Å°F @Temperature 1190 Å°F	
	22.0 W/m-K @Temperature 704 Å°C	153 BTU-in/hr-ftÅ²-Å°F @Temperature 1300 Å°F	
	23.1 W/m-K @Temperature 760 Å°C	160 BTU-in/hr-ftÅ²-Å°F @Temperature 1400 Å°F	
	24.1 W/m-K @Temperature 816 Å°C	167 BTU-in/hr-ftÅ²-Å°F @Temperature 1500 Å°F	

Thermal Properties	Metric	English	Comments
	@Temperature 871 Â°C	@Temperature 1600 Â°F	
Melting Point	1310 - 1345 Â°C	2390 - 2453 Â°F	
Solidus	1310 Â°C	2390 Â°F	
Liquidus	1335 Â°C	2435 Â°F	

Component Elements Properties	Metric	English	Comments
Aluminum, Al	1.4 - 1.6 %	1.4 - 1.6 %	
Boron, B	0.0030 - 0.010 %	0.0030 - 0.010 %	
Carbon, C	0.050 - 0.12 %	0.050 - 0.12 %	
Chromium, Cr	18 - 20 %	18 - 20 %	
Cobalt, Co	10 - 12 %	10 - 12 %	
Iron, Fe	<= 5.0 %	<= 5.0 %	
Manganese, Mn	<= 0.10 %	<= 0.10 %	
Molybdenum, Mo	9.0 - 10.5 %	9.0 - 10.5 %	
Nickel, Ni	53 %	53 %	As Remainder
Silicon, Si	<= 0.50 %	<= 0.50 %	

Electrical Properties	Metric	English	Comments
Magnetic Permeability	<= 1.002 @Temperature 21.0 Â°C	<= 1.002 @Temperature 69.8 Â°F	at 200 oersteds

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