

## Haynes R-41 alloy, 0.635 mm thick sheet, solution heat treated at 1079°C, water quenched, 30 minutes at 1066°C, aged 16 hours at 760°C (1400°F), air cooled

Category : Metal , Nonferrous Metal , Nickel Alloy , Superalloy

### Material Notes:

Vacuum melted, exceptionally high strength at temperature between 649-982°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-0635-mm-thick-sheet-solution-heat-treated-at-1079C-water-quenched-30-minutes-at-1066C-aged-16-hours-at-760C-1400F-air-cooled.php](http://www.lookpolymers.com/polymer_Haynes-R-41-alloy-0635-mm-thick-sheet-solution-heat-treated-at-1079C-water-quenched-30-minutes-at-1066C-aged-16-hours-at-760C-1400F-air-cooled.php)

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

Mechanical Properties	Metric	English	Comments
Tensile Strength, Ultimate	664 MPa	96300 psi	
	@Temperature 871 Å°C	@Temperature 1600 Å°F	
	924 MPa	134000 psi	
	@Temperature 760 Å°C	@Temperature 1400 Å°F	
Tensile Strength, Yield	1047 MPa	151900 psi	
	@Temperature 649 Å°C	@Temperature 1200 Å°F	
	506 MPa	73400 psi	
	@Strain 0.200 %, Temperature 871 Å°C	@Strain 0.200 %, Temperature 1600 Å°F	
Elongation at Break	785 MPa	114000 psi	
	@Strain 0.200 %, Temperature 760 Å°C	@Strain 0.200 %, Temperature 1400 Å°F	
	847 MPa	123000 psi	
	@Strain 0.200 %, Temperature 649 Å°C	@Strain 0.200 %, Temperature 1200 Å°F	
	2.0 %	2.0 %	
	@Temperature 871 Å°C	@Temperature 1600 Å°F	in 50.8 mm

Mechanical Properties	Metric	English	Comments
	@Temperature 760 Â°C	@Temperature 1400 Â°F	in 50.8 mm
	7.0 %	7.0 %	
	@Temperature 649 Â°C	@Temperature 1200 Â°F	in 50.8 mm
<b>Modulus of Elasticity</b>	<b>185 GPa</b>	<b>26800 ksi</b>	<b>RT</b>
	110 GPa	16000 ksi	
	@Temperature 871 Â°C	@Temperature 1600 Â°F	
	163 GPa	23600 ksi	
	@Temperature 760 Â°C	@Temperature 1400 Â°F	
	185 GPa	26800 ksi	
	@Temperature 649 Â°C	@Temperature 1200 Â°F	
<b>Poissons Ratio</b>	<b>0.31</b>	<b>0.31</b>	<b>27Â°C (80Â°F)</b>
	0.31	0.31	
	@Temperature 149 Â°C	@Temperature 300 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	

Mechanical Properties	Metric	English	Comments
	0.35 @Temperature 843 Â°C	0.35 @Temperature 1550 Â°F	
Shear Modulus	83.0 GPa	12000 ksi	27Â°C
	55.0 GPa @Temperature 927 Â°C	7980 ksi @Temperature 1700 Â°F	
	61.0 GPa @Temperature 843 Â°C	8850 ksi @Temperature 1550 Â°F	
	64.0 GPa @Temperature 760 Â°C	9280 ksi @Temperature 1400 Â°F	
	67.0 GPa @Temperature 677 Â°C	9720 ksi @Temperature 1250 Â°F	
	69.0 GPa @Temperature 593 Â°C	10000 ksi @Temperature 1100 Â°F	
	72.0 GPa @Temperature 482 Â°C	10400 ksi @Temperature 900 Â°F	
	75.0 GPa @Temperature 371 Â°C	10900 ksi @Temperature 700 Â°F	
	77.0 GPa @Temperature 260 Â°C	11200 ksi @Temperature 500 Â°F	
	81.0 GPa @Temperature 149 Â°C	11700 ksi @Temperature 300 Â°F	

Thermal Properties	Metric	English	Comments
CTE, linear	13.5 Âµm/m-Â°C @Temperature 21.0 - 538 Â°C	7.50 Âµin/in-Â°F @Temperature 69.8 - 1000 Â°F	
	14.0 Âµm/m-Â°C @Temperature 21.0 -	7.78 Âµin/in-Â°F @Temperature 69.8 -	

Thermal Properties	649 Å°C Metric	1200 Å°F English	Comments
	14.8 Åµm/m-Å°C	8.22 Åµin/in-Å°F	
	@Temperature 21.0 - 760 Å°C	@Temperature 69.8 - 1400 Å°F	
	15.2 Åµm/m-Å°C	8.44 Åµin/in-Å°F	
	@Temperature 21.0 - 871 Å°C	@Temperature 69.8 - 1600 Å°F	
	16.3 Åµm/m-Å°C	9.06 Åµin/in-Å°F	
	@Temperature 21.0 - 927 Å°C	@Temperature 69.8 - 1700 Å°F	
	16.8 Åµm/m-Å°C	9.33 Åµin/in-Å°F	
	@Temperature 21.0 - 982 Å°C	@Temperature 69.8 - 1800 Å°F	
Specific Heat Capacity	0.452 J/g-Å°C	0.108 BTU/lb-Å°F	
	@Temperature 21.0 Å°C	@Temperature 69.8 Å°F	
Thermal Conductivity	11.5 W/m-K	79.8 BTU-in/hr-ftÅ²-Å°F	
	@Temperature 149 Å°C	@Temperature 300 Å°F	
	12.5 W/m-K	86.8 BTU-in/hr-ftÅ²-Å°F	
	@Temperature 204 Å°C	@Temperature 399 Å°F	
	13.6 W/m-K	94.4 BTU-in/hr-ftÅ²-Å°F	
	@Temperature 260 Å°C	@Temperature 500 Å°F	
	14.7 W/m-K	102 BTU-in/hr-ftÅ²-Å°F	
	@Temperature 316 Å°C	@Temperature 601 Å°F	
	16.8 W/m-K	117 BTU-in/hr-ftÅ²-Å°F	
	@Temperature 427 Å°C	@Temperature 801 Å°F	
	18.8 W/m-K	130 BTU-in/hr-ftÅ²-Å°F	
	@Temperature 538 Å°C	@Temperature 1000 Å°F	
	20.0 W/m-K	139 BTU-in/hr-ftÅ²-Å°F	
	@Temperature 593 Å°C	@Temperature 1100 Å°F	
	21.0 W/m-K	146 BTU-in/hr-ftÅ²-Å°F	
		@Temperature 1190	

Thermal Properties	@Temperature 644 °C Metric	°F English	Comments
	22.0 W/m-K	153 BTU-in/hr-ft <sup>2</sup> -°F	
	@Temperature 704 °C	@Temperature 1300 °F	
	23.1 W/m-K	160 BTU-in/hr-ft <sup>2</sup> -°F	
	@Temperature 760 °C	@Temperature 1400 °F	
	24.1 W/m-K	167 BTU-in/hr-ft <sup>2</sup> -°F	
	@Temperature 816 °C	@Temperature 1500 °F	
	25.1 W/m-K	174 BTU-in/hr-ft <sup>2</sup> -°F	
	@Temperature 871 °C	@Temperature 1600 °F	
Melting Point	1310 - 1345 °C	2390 - 2453 °F	
Solidus	1310 °C	2390 °F	
Liquidus	1335 °C	2435 °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 %	
Sulfur, S	<= 0.015 %	<= 0.015 %	
Titanium, Ti	3.0 - 3.3 %	3.0 - 3.3 %	

Electrical Properties	Metric	English	Comments
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Electrical Properties	<sup>&lt;= 1.002</sup> Metric	<sup>7.217</sup> English	Comments
Magnetic Permeability	@Temperature 21.0 Â°C	@Temperature 69.8 Â°F	200 Dersted

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