

## Haynes Multimet® alloy, sand cast, 1171°C heat treatment for 2 hours

Category : Metal , Superalloy , Iron Base

### Material Notes:

Recommended for use in applications involving high stress at temperatures up to 816°C (1500°F), and moderate stresses up to 1093°C (2000°F). Excellent oxidation resistance, good ductility, and is readily fabricated. Current applications include aircraft, including tailpipes and tailcones, afterburner parts, exhaust manifolds, combustion chambers, turbine blades, buckets and nozzles. Excellent service for high temperature bolts. Data provided by the manufacturer, Haynes International, Inc.

Order this product through the following link:

[http://www.lookpolymers.com/polymer\\_Haynes-Multimet-alloy-sand-cast-1171C-heat-treatment-for-2-hours.php](http://www.lookpolymers.com/polymer_Haynes-Multimet-alloy-sand-cast-1171C-heat-treatment-for-2-hours.php)

Physical Properties	Metric	English	Comments
Density	8.20 g/cc	0.296 lb/in <sup>3</sup>	

Mechanical Properties	Metric	English	Comments
Tensile Strength, Ultimate	675 MPa	97900 psi	
	103 MPa	14900 psi	
	@Temperature 1066 °C	@Temperature 1951 °F	
	150 MPa	21800 psi	
	@Temperature 982 °C	@Temperature 1800 °F	
	230 MPa	33400 psi	
	@Temperature 899 °C	@Temperature 1650 °F	
	321 MPa	46600 psi	
	@Temperature 816 °C	@Temperature 1500 °F	
	380 MPa	55100 psi	
@Temperature 732 °C	@Temperature 1350 °F		
446 MPa	64700 psi		
@Temperature 649 °C	@Temperature 1200 °F		
451 MPa	65400 psi		
@Temperature 593 °C	@Temperature 1100 °F		
487 MPa	70600 psi		

Mechanical Properties	Metric	English	Comments
	@Temperature 538 Â°C	@Temperature 1000 Â°F	
	530 MPa	76900 psi	
	@Temperature 427 Â°C	@Temperature 801 Â°F	
	538 MPa	78000 psi	
	@Temperature 316 Â°C	@Temperature 601 Â°F	
	549 MPa	79600 psi	
	@Temperature 204 Â°C	@Temperature 399 Â°F	
<b>Tensile Strength, Yield</b>	372 MPa	54000 psi	
	@Strain 0.200 %	@Strain 0.200 %	
<b>Elongation at Break</b>	23 %	23 %	in 50.8 mm
	11 %	11 %	in 50.8 mm
	@Temperature 816 Â°C	@Temperature 1500 Â°F	
	15 %	15 %	in 50.8 mm
	@Temperature 732 Â°C	@Temperature 1350 Â°F	
	23 %	23 %	in 50.8 mm
	@Temperature 593 Â°C	@Temperature 1100 Â°F	
	23 %	23 %	in 50.8 mm
	@Temperature 649 Â°C	@Temperature 1200 Â°F	
	23 %	23 %	in 50.8 mm
	@Temperature 204 Â°C	@Temperature 399 Â°F	
	24 %	24 %	in 50.8 mm
	@Temperature 316 Â°C	@Temperature 601 Â°F	
	24 %	24 %	in 50.8 mm
	@Temperature 899 Â°C	@Temperature 1650 Â°F	
	25 %	25 %	in 50.8 mm
	@Temperature 427 Â°C	@Temperature 801 Â°F	
	25 %	25 %	in 50.8 mm
	@Temperature 538 Â°C	@Temperature 1000	

Mechanical Properties	Metric	English	Comments
	31 %	31 %	
	@Temperature 982 Â°C	@Temperature 1800 Â°F	in 50.8 mm
	39 %	39 %	
	@Temperature 1066 Â°C	@Temperature 1951 Â°F	in 50.8 mm
Reduction of Area	25 %	25 %	
	19 %	19 %	
	@Temperature 816 Â°C	@Temperature 1500 Â°F	
	20 %	20 %	
	@Temperature 732 Â°C	@Temperature 1350 Â°F	
	24 %	24 %	
	@Temperature 649 Â°C	@Temperature 1200 Â°F	
	25 %	25 %	
	@Temperature 593 Â°C	@Temperature 1100 Â°F	
	26 %	26 %	
	@Temperature 427 Â°C	@Temperature 801 Â°F	
	27 %	27 %	
	@Temperature 538 Â°C	@Temperature 1000 Â°F	
	27 %	27 %	
	@Temperature 204 Â°C	@Temperature 399 Â°F	
	27 %	27 %	
	@Temperature 316 Â°C	@Temperature 601 Â°F	
	29 %	29 %	
	@Temperature 899 Â°C	@Temperature 1650 Â°F	
	42 %	42 %	
	@Temperature 982 Â°C	@Temperature 1800 Â°F	
	45 %	45 %	

Mechanical Properties	@Temperature 1066 Metric °C	@Temperature 1951 English °F	Comments
Poissons Ratio	0.298	0.298	RT
	0.315	0.315	
	@Temperature 426 °C	@Temperature 799 °F	
	0.319	0.319	
	@Temperature -78.0 °C	@Temperature -108 °F	
	0.325	0.325	
	@Temperature 650 °C	@Temperature 1200 °F	
	0.339	0.339	
	@Temperature 816 °C	@Temperature 1500 °F	

Thermal Properties	Metric	English	Comments
CTE, linear	15.3 µm/m-°C	8.50 µin/in-°F	
	@Temperature 23.0 - 300 °C	@Temperature 73.4 - 572 °F	
	15.6 µm/m-°C	8.67 µin/in-°F	
	@Temperature 23.0 - 400 °C	@Temperature 73.4 - 752 °F	
	16.0 µm/m-°C	8.89 µin/in-°F	
	@Temperature 23.0 - 500 °C	@Temperature 73.4 - 932 °F	
	16.7 µm/m-°C	9.28 µin/in-°F	
	@Temperature 23.0 - 600 °C	@Temperature 73.4 - 1110 °F	
	17.2 µm/m-°C	9.56 µin/in-°F	
@Temperature 23.0 - 700 °C	@Temperature 73.4 - 1290 °F		
17.5 µm/m-°C	9.72 µin/in-°F		
@Temperature 23.0 - 800 °C	@Temperature 73.4 - 1470 °F		
17.8 µm/m-°C	9.89 µin/in-°F		
@Temperature 23.0 - 900 °C	@Temperature 73.4 - 1650 °F		

Thermal Properties	Metric	English	Comments
	17.8 $\mu\text{m}/\text{m}\cdot\text{Å}^\circ\text{C}$	9.89 $\mu\text{in}/\text{in}\cdot\text{Å}^\circ\text{F}$	
	@Temperature 23.0 - 1000 $\text{Å}^\circ\text{C}$	@Temperature 73.4 - 1830 $\text{Å}^\circ\text{F}$	
	18.4 $\mu\text{m}/\text{m}\cdot\text{Å}^\circ\text{C}$	10.2 $\mu\text{in}/\text{in}\cdot\text{Å}^\circ\text{F}$	
	@Temperature 23.0 - 1100 $\text{Å}^\circ\text{C}$	@Temperature 73.4 - 2010 $\text{Å}^\circ\text{F}$	
Specific Heat Capacity	0.435 J/g $\cdot\text{Å}^\circ\text{C}$	0.104 BTU/lb $\cdot\text{Å}^\circ\text{F}$	
	@Temperature $\geq 100$ $\text{Å}^\circ\text{C}$	@Temperature $\geq 212$ $\text{Å}^\circ\text{F}$	
Thermal Conductivity	15.9 W/m-K	110 BTU-in/hr-ft $\text{Å}^2\cdot\text{Å}^\circ\text{F}$	
	@Temperature 300 $\text{Å}^\circ\text{C}$	@Temperature 572 $\text{Å}^\circ\text{F}$	
	17.3 W/m-K	120 BTU-in/hr-ft $\text{Å}^2\cdot\text{Å}^\circ\text{F}$	
	@Temperature 400 $\text{Å}^\circ\text{C}$	@Temperature 752 $\text{Å}^\circ\text{F}$	
	18.6 W/m-K	129 BTU-in/hr-ft $\text{Å}^2\cdot\text{Å}^\circ\text{F}$	
	@Temperature 500 $\text{Å}^\circ\text{C}$	@Temperature 932 $\text{Å}^\circ\text{F}$	
	20.0 W/m-K	139 BTU-in/hr-ft $\text{Å}^2\cdot\text{Å}^\circ\text{F}$	
	@Temperature 600 $\text{Å}^\circ\text{C}$	@Temperature 1110 $\text{Å}^\circ\text{F}$	
	20.0 W/m-K	139 BTU-in/hr-ft $\text{Å}^2\cdot\text{Å}^\circ\text{F}$	
	@Temperature 200 $\text{Å}^\circ\text{C}$	@Temperature 392 $\text{Å}^\circ\text{F}$	
Melting Point	1288 - 1354 $\text{Å}^\circ\text{C}$	2350 - 2469 $\text{Å}^\circ\text{F}$	
Solidus	1288 $\text{Å}^\circ\text{C}$	2350 $\text{Å}^\circ\text{F}$	
Liquidus	1354 $\text{Å}^\circ\text{C}$	2469 $\text{Å}^\circ\text{F}$	

Optical Properties	Metric	English	Comments
Emissivity (0-1)	0.88	0.88	
	@Temperature 1090 $\text{Å}^\circ\text{C}$	@Temperature 1990 $\text{Å}^\circ\text{F}$	Oxidized

Component Elements Properties	Metric	English	Comments
Carbon, C	0.080 - 0.16 %	0.080 - 0.16 %	
Cb + Ta	0.75 - 1.25 %	0.75 - 1.25 %	
Chromium, Cr	20 - 22.5 %	20 - 22.5 %	
Cobalt, Co	18.5 - 21 %	18.5 - 21 %	

Component Elements Properties	Metric	English	Comments
Manganese, Mn	1.0 - 2.0 %	1.0 - 2.0 %	
Molybdenum, Mo	2.5 - 3.5 %	2.5 - 3.5 %	
Nickel, Ni	19 - 21 %	19 - 21 %	
Nitrogen, N	0.10 - 0.20 %	0.10 - 0.20 %	
Silicon, Si	<= 1.0 %	<= 1.0 %	
Tungsten, W	2.0 - 3.0 %	2.0 - 3.0 %	

Electrical Properties	Metric	English	Comments
Electrical Resistivity	0.0000930 ohm-cm @Temperature 22.0 Â°C	0.0000930 ohm-cm @Temperature 71.6 Â°F	

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