

## Haynes Multimet<sup>®</sup> alloy, 6.15 mm hot-rolled bar, 35% cold reduction

Category : Metal , Superalloy , Iron Base

### Material Notes:

Recommended for use in applications involving high stress at temperatures up to 816<sup>°</sup>C (1500<sup>°</sup>F), and moderate stresses up to 1093<sup>°</sup>C (2000<sup>°</sup>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-615-mm-hot-rolled-bar-35-cold-reduction.php](http://www.lookpolymers.com/polymer_Haynes-Multimet-alloy-615-mm-hot-rolled-bar-35-cold-reduction.php)

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

Mechanical Properties	Metric	English	Comments
Hardness, Brinell	369	369	Converted from Rockwell C hardness.
Hardness, Knoop	403	403	Converted from Rockwell C hardness.
Hardness, Rockwell C	40	40	
Hardness, Vickers	388	388	Converted from Rockwell C hardness.
Tensile Strength, Ultimate	1203 MPa	174500 psi	
Tensile Strength, Yield	1160 MPa	168000 psi	
	@Strain 0.200 %	@Strain 0.200 %	
Elongation at Break	10 %	10 %	in 50.8 mm
Poissons Ratio	0.298	0.298	RT
	0.315	0.315	
	@Temperature 426 <sup>°</sup> C	@Temperature 799 <sup>°</sup> F	
	0.319	0.319	
	@Temperature -78.0 <sup>°</sup> C	@Temperature -108 <sup>°</sup> F	
	0.325	0.325	
	@Temperature 650 <sup>°</sup> C	@Temperature 1200 <sup>°</sup> F	
	0.339	0.339	
	@Temperature 816 <sup>°</sup> C	@Temperature 1500 <sup>°</sup> F	

Thermal Properties	Metric	English	Comments
CTE, linear	15.3 $\mu\text{m}/\text{m}\cdot\text{Å}^\circ\text{C}$	8.50 $\mu\text{in}/\text{in}\cdot\text{Å}^\circ\text{F}$	
	@Temperature 23.0 - 300 $\text{Å}^\circ\text{C}$	@Temperature 73.4 - 572 $\text{Å}^\circ\text{F}$	
	15.6 $\mu\text{m}/\text{m}\cdot\text{Å}^\circ\text{C}$	8.67 $\mu\text{in}/\text{in}\cdot\text{Å}^\circ\text{F}$	
	@Temperature 23.0 - 400 $\text{Å}^\circ\text{C}$	@Temperature 73.4 - 752 $\text{Å}^\circ\text{F}$	
	16.0 $\mu\text{m}/\text{m}\cdot\text{Å}^\circ\text{C}$	8.89 $\mu\text{in}/\text{in}\cdot\text{Å}^\circ\text{F}$	
	@Temperature 23.0 - 500 $\text{Å}^\circ\text{C}$	@Temperature 73.4 - 932 $\text{Å}^\circ\text{F}$	
	16.7 $\mu\text{m}/\text{m}\cdot\text{Å}^\circ\text{C}$	9.28 $\mu\text{in}/\text{in}\cdot\text{Å}^\circ\text{F}$	
	@Temperature 23.0 - 600 $\text{Å}^\circ\text{C}$	@Temperature 73.4 - 1110 $\text{Å}^\circ\text{F}$	
	17.2 $\mu\text{m}/\text{m}\cdot\text{Å}^\circ\text{C}$	9.56 $\mu\text{in}/\text{in}\cdot\text{Å}^\circ\text{F}$	
	@Temperature 23.0 - 700 $\text{Å}^\circ\text{C}$	@Temperature 73.4 - 1290 $\text{Å}^\circ\text{F}$	
Specific Heat Capacity	17.5 $\mu\text{m}/\text{m}\cdot\text{Å}^\circ\text{C}$	9.72 $\mu\text{in}/\text{in}\cdot\text{Å}^\circ\text{F}$	
	@Temperature 23.0 - 800 $\text{Å}^\circ\text{C}$	@Temperature 73.4 - 1470 $\text{Å}^\circ\text{F}$	
	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 $\text{Å}^\circ\text{F}$	
	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 - 900 $\text{Å}^\circ\text{C}$	@Temperature 73.4 - 1650 $\text{Å}^\circ\text{F}$	
	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 $\text{Å}^\circ\text{F}$	
	0.435 J/g- $\text{Å}^\circ\text{C}$	0.104 BTU/lb- $\text{Å}^\circ\text{F}$	
	@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 $\text{Å}^2$ - $\text{Å}^\circ\text{F}$	
	@Temperature 300 $\text{Å}^\circ\text{C}$	@Temperature 572 $\text{Å}^\circ\text{F}$	
	17.3 W/m-K	120 BTU-in/hr-ft $\text{Å}^2$ - $\text{Å}^\circ\text{F}$	
@Temperature 400 $\text{Å}^\circ\text{C}$	@Temperature 752 $\text{Å}^\circ\text{F}$		
18.6 W/m-K	129 BTU-in/hr-ft $\text{Å}^2$ - $\text{Å}^\circ\text{F}$		

Thermal Properties	@Temperature 500 Â°C Metric	@Temperature 932 Â°F English	Comments
	20.0 W/m-K	139 BTU-in/hr-ftÂ²-Â°F	
	@Temperature 600 Â°C	@Temperature 1110 Â°F	
	20.0 W/m-K	139 BTU-in/hr-ftÂ²-Â°F	
	@Temperature 200 Â°C	@Temperature 392 Â°F	
Melting Point	1288 - 1354 Â°C	2350 - 2469 Â°F	
Solidus	1288 Â°C	2350 Â°F	
Liquidus	1354 Â°C	2469 Â°F	

Optical Properties	Metric	English	Comments
Emissivity (0-1)	0.88	0.88	
	@Temperature 1090 Â°C	@Temperature 1990 Â°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 %	
Iron, Fe	33 %	33 %	As remainder
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	0.0000930 ohm-cm	
	@Temperature 22.0 Â°C	@Temperature 71.6 Â°F	

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