

## Haynes Multimet® alloy, 533.4 by 82.55 mm forging, stress relieved at 649°C (1200°F), air cooled

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-5334-by-8255-mm-forging-stress-relieved-at-649C-1200F-air-cooled.php](http://www.lookpolymers.com/polymer_Haynes-Multimet-alloy-5334-by-8255-mm-forging-stress-relieved-at-649C-1200F-air-cooled.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	811 MPa	118000 psi	
	572 MPa @Temperature 649 °C	83000 psi @Temperature 1200 °F	
Tensile Strength, Yield	493 MPa @Strain 0.200 %	71500 psi @Strain 0.200 %	
	338 MPa @Strain 0.200 %, Temperature 649 °C	49000 psi @Strain 0.200 %, Temperature 1200 °F	
Elongation at Break	30 %	30 %	in 50.8 mm
	25 % @Temperature 649 °C	25 % @Temperature 1200 °F	in 50.8 mm
Modulus of Elasticity	214 GPa	31000 ksi	
	159 GPa @Temperature 649 °C	23100 ksi @Temperature 1200 °F	
Poissons Ratio	0.298	0.298	RT
	0.315 @Temperature 426 °C	0.315 @Temperature 799 °F	
	0.319	0.319	

Mechanical Properties	@Temperature -78.0 °C Metric	@Temperature -108 °F English	Comments
	0.325	0.325	
	@Temperature 650 °C	@Temperature 1200 °F	
	0.339	0.339	
	@Temperature 816 °C	@Temperature 1500 °F	
Shear Modulus	82.4 GPa	12000 ksi	Calculated

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	
	17.8 µm/m-°C	9.89 µin/in-°F	
	@Temperature 23.0 - 1000 °C	@Temperature 73.4 - 1830 °F	
	18.4 µm/m-°C	10.2 µin/in-°F	
	@Temperature 23.0 - 1100 °C	@Temperature 73.4 - 2010 °F	
Specific Heat Capacity	0.435 J/g-°C	0.104 BTU/lb-°F	

Thermal Properties	@Temperature >=100 Metric	@Temperature >=212 English	Comments
Thermal Conductivity	15.9 W/m-K	110 BTU-in/hr-ft <sup>2</sup> -°F	
	@Temperature 300 °C	@Temperature 572 °F	
	17.3 W/m-K	120 BTU-in/hr-ft <sup>2</sup> -°F	
	@Temperature 400 °C	@Temperature 752 °F	
	18.6 W/m-K	129 BTU-in/hr-ft <sup>2</sup> -°F	
	@Temperature 500 °C	@Temperature 932 °F	
	20.0 W/m-K	139 BTU-in/hr-ft <sup>2</sup> -°F	
	@Temperature 600 °C	@Temperature 1110 °F	
	20.0 W/m-K	139 BTU-in/hr-ft <sup>2</sup> -°F	
	@Temperature 200 °C	@Temperature 392 °F	
Melting Point	1288 - 1354 °C	2350 - 2469 °F	
Solidus	1288 °C	2350 °F	
Liquidus	1354 °C	2469 °F	

Optical Properties	Metric	English	Comments
Emissivity (0-1)	0.88	0.88	Oxidized
	@Temperature 1090 °C	@Temperature 1990 °F	

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 %	

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

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