

## Haynes Ultimet® alloy, mill annealed

Category : Metal , Nonferrous Metal , Cobalt Alloy , Superalloy

### Material Notes:

Co content as balance, excellent corrosion resistance, outstanding wear resistance, high tensile strength combined with excellent impact toughness and ductility. Ideal welding material with exceptional ductility and resistance to weld cracking, very easy to apply as an overlay, multiple layers applicable with little to no preheat. Applications include agitators, blenders, bolts, dies, extruders, fan blades, filters, glass plungers, nozzles, pumps, rolls, screw conveyors, and valve parts. Data provided by the manufacturer, Haynes International, Inc.

Order this product through the following link:

[http://www.lookpolymers.com/polymer\\_Haynes-Ultimet-alloy-mill-annealed.php](http://www.lookpolymers.com/polymer_Haynes-Ultimet-alloy-mill-annealed.php)

Physical Properties	Metric	English	Comments
Density	8.47 g/cc	0.306 lb/in <sup>3</sup>	

Mechanical Properties	Metric	English	Comments
Hardness, Brinell	290	290	Converted from Rockwell C hardness.
Hardness, Knoop	311	311	Converted from Rockwell C hardness.
Hardness, Rockwell C	30	30	
Hardness, Vickers	301	301	Converted from Rockwell C hardness.
Tensile Strength, Ultimate	1020 MPa	148000 psi	
Tensile Strength, Yield	545 MPa @Strain 0.200 %	79000 psi @Strain 0.200 %	
Elongation at Break	36 %	36 %	in 50.8 mm
Modulus of Elasticity	180 GPa @Temperature 649 Â°C	26100 ksi @Temperature 1200 Â°F	(heat treated at 1121Â°C (2050Â°F), water quenched plate)
	189 GPa @Temperature 538 Â°C	27400 ksi @Temperature 1000 Â°F	(heat treated at 1121Â°C (2050Â°F), water quenched plate)
	197 GPa @Temperature 427 Â°C	28600 ksi @Temperature 801 Â°F	(heat treated at 1121Â°C (2050Â°F), water quenched plate)
	206 GPa @Temperature 316 Â°C	29900 ksi @Temperature 601 Â°F	(heat treated at 1121Â°C (2050Â°F), water quenched plate)
	215 GPa	31200 ksi	(heat treated at 1121Â°C (2050Â°F), water quenched plate)

Mechanical Properties	@Temperature 204 Å°C Metric	@Temperature 399 Å°F English	Comments
Charpy Impact	176 J	130 ft-lb	
	92.0 J	67.9 ft-lb	
	@Temperature -196 Å°C	@Temperature -321 Å°F	

Thermal Properties	Metric	English	Comments
CTE, linear	14.0 Åµm/m-Å°C	7.78 Åµin/in-Å°F	
	@Temperature 26.0 - 316 Å°C	@Temperature 78.8 - 601 Å°F	
	14.5 Åµm/m-Å°C	8.06 Åµin/in-Å°F	
	@Temperature 26.0 - 427 Å°C	@Temperature 78.8 - 801 Å°F	
	14.8 Åµm/m-Å°C	8.22 Åµin/in-Å°F	
	@Temperature 26.0 - 538 Å°C	@Temperature 78.8 - 1000 Å°F	
	15.1 Åµm/m-Å°C	8.39 Åµin/in-Å°F	
	@Temperature 26.0 - 649 Å°C	@Temperature 78.8 - 1200 Å°F	
Specific Heat Capacity	15.9 Åµm/m-Å°C	8.83 Åµin/in-Å°F	
	@Temperature 26.0 - 760 Å°C	@Temperature 78.8 - 1400 Å°F	
	16.4 Åµm/m-Å°C	9.11 Åµin/in-Å°F	
	@Temperature 26.0 - 871 Å°C	@Temperature 78.8 - 1600 Å°F	
	16.9 Åµm/m-Å°C	9.39 Åµin/in-Å°F	
	@Temperature 26.0 - 982 Å°C	@Temperature 78.8 - 1800 Å°F	
	0.456 J/g-Å°C	0.109 BTU/lb-Å°F	
	@Temperature 23.0 Å°C	@Temperature 73.4 Å°F	
0.470 J/g-Å°C	0.112 BTU/lb-Å°F		
@Temperature 100 Å°C	@Temperature 212 Å°F		
0.482 J/g-Å°C	0.115 BTU/lb-Å°F		
@Temperature 200 Å°C	@Temperature 392 Å°F		
0.504 J/g-Å°C	0.120 BTU/lb-Å°F		

Thermal Properties	@Temperature 300 Â°C Metric	@Temperature 572 Â°F English	Comments
	0.525 J/g-Â°C	0.125 BTU/lb-Â°F	
	@Temperature 400 Â°C	@Temperature 752 Â°F	
	0.545 J/g-Â°C	0.130 BTU/lb-Â°F	
	@Temperature 500 Â°C	@Temperature 932 Â°F	
	0.573 J/g-Â°C	0.137 BTU/lb-Â°F	
	@Temperature 600 Â°C	@Temperature 1110 Â°F	
Thermal Conductivity	12.3 W/m-K	85.4 BTU-in/hr-ftÂ²- Â°F	
	@Temperature 23.0 Â°C	@Temperature 73.4 Â°F	
	13.8 W/m-K	95.8 BTU-in/hr-ftÂ²- Â°F	
	@Temperature 100 Â°C	@Temperature 212 Â°F	
	15.6 W/m-K	108 BTU-in/hr-ftÂ²-Â°F	
	@Temperature 200 Â°C	@Temperature 392 Â°F	
	17.5 W/m-K	121 BTU-in/hr-ftÂ²-Â°F	
	@Temperature 300 Â°C	@Temperature 572 Â°F	
	19.4 W/m-K	135 BTU-in/hr-ftÂ²-Â°F	
	@Temperature 400 Â°C	@Temperature 752 Â°F	
	21.5 W/m-K	149 BTU-in/hr-ftÂ²-Â°F	
	@Temperature 500 Â°C	@Temperature 932 Â°F	
	23.9 W/m-K	166 BTU-in/hr-ftÂ²-Â°F	
	@Temperature 600 Â°C	@Temperature 1110 Â°F	
Melting Point	1332 - 1354 Â°C	2430 - 2469 Â°F	
Solidus	1332 Â°C	2430 Â°F	
Liquidus	1354 Â°C	2469 Â°F	

Component Elements Properties	Metric	English	Comments
Carbon, C	0.060 %	0.060 %	
Chromium, Cr	26 %	26 %	
Cobalt, Co	54 %	54 %	

Component Elements Properties	Metric	English	Comments
Manganese, Mn	0.80 %	0.80 %	
Molybdenum, Mo	5.0 %	5.0 %	
Nickel, Ni	9.0 %	9.0 %	
Nitrogen, N	0.080 %	0.080 %	
Silicon, Si	0.30 %	0.30 %	
Tungsten, W	2.0 %	2.0 %	

Electrical Properties	Metric	English	Comments
Electrical Resistivity	0.0000870 ohm-cm	0.0000870 ohm-cm	
	@Temperature 23.0 Â°C	@Temperature 73.4 Â°F	
	0.0000890 ohm-cm	0.0000890 ohm-cm	
	@Temperature 100 Â°C	@Temperature 212 Â°F	
	0.0000930 ohm-cm	0.0000930 ohm-cm	
	@Temperature 200 Â°C	@Temperature 392 Â°F	
	0.0000960 ohm-cm	0.0000960 ohm-cm	
	@Temperature 300 Â°C	@Temperature 572 Â°F	
0.000100 ohm-cm	@Temperature 400 Â°C	@Temperature 752 Â°F	
	0.000103 ohm-cm	0.000103 ohm-cm	
@Temperature 500 Â°C	@Temperature 932 Â°F		
0.000105 ohm-cm	@Temperature 600 Â°C	@Temperature 1110 Â°F	

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