Haynes Hastelloy® B-3® alloy, heat treated at 1065°C, rapid quenched

Category : Metal , Nonferrous Metal , Nickel Alloy , Superalloy

Material Notes:

The attributes of Corrosion-Resistant HASTELLOY® alloys include high resistance to uniform attack, outstanding localized corrosion resistance, excellent stress corrosion cracking resistance, and ease of welding and fabrication. Same excellent resistance to hydrochloric acid and other strongly reducing chemicals as B-2 alloy, but with significantly better thermal stability, fabricability and stress corrosion cracking resistance. In The As-Welded Condition HASTELLOY® B-3® alloy is an additional member of the nickel-molybdenum family of alloys with excellent resistance to hydrochloric acid at all concentrations and temperatures. It also withstands sulfuric, acetic, formic and phosphoric acids, and other nonoxidizing media. B-3 alloy has excellent resistance to pitting corrosion, to stress-corrosion cracking and to knife-line and heat-affected zone attack.The improved thermal stability of HASTELLOY B-3 alloy minimizes the problems associated with fabrication of B-2 alloy components. This is due to the reduced tendency to precipitate deleterious intermetallic phases in B-3 alloy, thereby, affording it greater ductility than B-2 alloy during and following various thermal cycling conditions. HASTELLOY B-3 alloy has good overall forming and welding characteristics. It may be forged or otherwise hotworked, providing that it is held at 2250°F (1230°C) for a time sufficient to bring the entire piece to temperature. Since it is a low carbon alloy, the use of lower hot finishing temperatures may be necessary to achieve grain size control. B-3 alloy may also be formed by cold working. Although it does work-harden somewhat rapidly, B-3 alloy components can be made using all common cold forming techniques. Limited tests in boiling 20 percent hydrochloric acid indicate that the uniform corrosion resistance of B-3 alloy is not affected by cold reductions up to 50 percent as compared to that of the alloy in the solution heat-treated condition. B-3 alloy can be welded by all common welding techniques, although oxyacetylene and submerged arc welding processes are not recommended when the fabricated item is to be used in corrosive service. Special precautions should be taken to avoid excessive heat input. Heat Treatment: All wrought forms of HASTELLOY B-3 alloy are furnished in the solution heat treated condition unless otherwise specified. B-3 alloy is solution heat-treated at 1950°F (1065°C) and rapid quenched, except for bright annealed sheet or coil products which are heat-treated at 2100°F (1150°C) and cooled in hydrogen. Applications: HASTELLOY B-3 alloy is suitable for use in all applications previously requiring the use of HASTELLOY B-2 alloy. Like B-2 alloy, B-3 is not recommended for use in the presence of ferric or cupric salts as these salts may cause rapid corrosion failure. Ferric or cupric salts may develop when hydrochloric acid comes in contact with iron or copper. ASME Boiler And Pressure Vessel Code ASME has published Code Case 2140 for solution annealed HASTELLOY B-3 alloyData provided by the manufacturer, Haynes International, Inc.

Order this product through the following link:
http://www.lookpolymers.com/polymer_Haynes-Hastelloy-B-3-alloy-heat-treated-at-1065C-rapid-quenched.php

Physical Properties	Metric	English	Comments
Density	9.22 g/cc	0.333 lb/in³	at RT

Mechanical Properties	Metric	English	Comments
Tensile Strength, Ultimate	890 MPa	129000 psi	
Tensile Strength, Yield	385 MPa @Strain 0.200 %	55800 psi @Strain 0.200 %	
Elongation at Break	60.4 %	60.4 %	in 51 mm

Mechanical Properties	Metric	English	Comments
Modulus of Elasticity	216 GPa	31300 ksi	RT
	147 GPa	21300 ksi	
	@Temperature 1000 °C	@Temperature 1830 °F	
	157 GPa	22800 ksi	
	@Temperature 900 °C	@Temperature 1650 °F	
	168 GPa	24400 ksi	
	@Temperature 800 °C	@Temperature 1470 °F	
	178 GPa	25800 ksi	
	@Temperature 700 °C	@Temperature 1290 °F	
	185 GPa	26800 ksi	
	@Temperature 600 °C	@Temperature 1110 °F	
	190 GPa	27600 ksi	
	@Temperature 500 °C	@Temperature 932 °F	
	197 GPa	28600 ksi	
	@Temperature 400 °C	@Temperature 752 °F	
	202 GPa	29300 ksi	
	@Temperature 300 °C	@Temperature 572 °F	
	208 GPa	30200 ksi	
	@Temperature 200 °C	@Temperature 392 °F	
	213 GPa	30900 ksi	
	@Temperature 100 °C	@Temperature 212 °F	
Charpy Impact	358 J	264 ft-lb	

Thermal Properties	Metric	English	Comments
CTE, linear	11.4 µm/m-°C	6.33 µin/in-°F	
	@Temperature 25.0 - 300 °C	@Temperature 77.0 - 572 °F	
	11.6 µm/m-°C	6.44 µin/in-°F	
	@Temperature 25.0 - 400 °C	@Temperature 77.0 - 752 °F	
	11.8 µm/m-°C	6.56 µin/in-°F	
	@Temperature 25.0 - 600 °C	@Temperature 77.0 - 1110 °F	

Thermal Properties	Metric	English	Comments
	@Temperature 25.0 - 500 °C	@Temperature 77.0 - 932 °F	
	12.2 µm/m-°C @Temperature 25.0 - 700 °C	6.78 µin/in-°F @Temperature 77.0 - 1290 °F	
	13.1 µm/m-°C @Temperature 25.0 - 800 °C	7.28 µin/in-°F @Temperature 77.0 - 1470 °F	
	13.9 µm/m-°C @Temperature 25.0 - 900 °C	7.72 µin/in-°F @Temperature 77.0 - 1650 °F	
	14.4 µm/m-°C @Temperature 25.0 - 1000 °C	8.00 µin/in-°F @Temperature 77.0 - 1830 °F	
Specific Heat Capacity	0.373 J/g-°C	0.0891 BTU/lb-°F	RT
	0.382 J/g-°C @Temperature 100 °C	0.0913 BTU/lb-°F @Temperature 212 °F	
	0.409 J/g-°C @Temperature 200 °C	0.0978 BTU/lb-°F @Temperature 392 °F	
	0.421 J/g-°C @Temperature 300 °C	0.101 BTU/lb-°F @Temperature 572 °F	
	0.431 J/g-°C @Temperature 400 °C	0.103 BTU/lb-°F @Temperature 752 °F	
	0.434 J/g-°C @Temperature 600 °C	0.104 BTU/lb-°F @Temperature 1110 °F	
	0.436 J/g-°C @Temperature 500 °C	0.104 BTU/lb-°F @Temperature 932 °F	
	0.575 J/g-°C @Temperature 1000 °C	0.137 BTU/lb-°F @Temperature 1830 °F	
	0.577 J/g-°C @Temperature 900 °C	0.138 BTU/lb-°F @Temperature 1650 °F	
	0.589 J/g-°C	0.141 BTU/lb-°F	

Thermal Properties	Metric	English	Comments
	@Temperature 800 °C	@Temperature 1470 °F	
	0.595 J/g-°C	0.142 BTU/lb-°F	
	@Temperature 700 °C	@Temperature 1290 °F	
Thermal Conductivity	11.2 W/m-K	77.7 BTU-in/hr-ft²-°F	RT
	12.1 W/m-K	84.0 BTU-in/hr-ft²-°F	
	@Temperature 100 °C	@Temperature 212 °F	
	13.4 W/m-K	93.0 BTU-in/hr-ft²-°F	
	@Temperature 200 °C	@Temperature 392 °F	
	14.8 W/m-K	103 BTU-in/hr-ft²-°F	
	@Temperature 300 °C	@Temperature 572 °F	
	16.3 W/m-K	113 BTU-in/hr-ft²-°F	
	@Temperature 400 °C	@Temperature 752 °F	
	17.9 W/m-K	124 BTU-in/hr-ft²-°F	
	@Temperature 500 °C	@Temperature 932 °F	
	19.6 W/m-K	136 BTU-in/hr-ft²-°F	
	@Temperature 600 °C	@Temperature 1110 °F	
	21.4 W/m-K	149 BTU-in/hr-ft²-°F	
	@Temperature 700 °C	@Temperature 1290 °F	
	21.4 W/m-K	149 BTU-in/hr-ft²-°F	
	@Temperature 800 °C	@Temperature 1470 °F	
	23.3 W/m-K	162 BTU-in/hr-ft²-°F	
	@Temperature 900 °C	@Temperature 1650 °F	
	27.5 W/m-K	191 BTU-in/hr-ft²-°F	
	@Temperature 1000 °C	@Temperature 1830 °F	
Melting Point	1370 - 1418 °C	2500 - 2584 °F	
Solidus	1370 °C	2500 °F	
Liquidus	1418 °C	2584 °F	

Component Elements Properties	Metric	English	Comments
Aluminum, Al	<= 0.50 %	<= 0.50 %	
Carbon, C	<= 0.010 %	<= 0.010 %	

Component Elements Properties	Metric	English	Comments
Cobalt, Co	<= 3.0 %	<= 3.0 %	
Iron, Fe	1.5 %	1.5 %	
Manganese, Mn	<= 3.0 %	<= 3.0 %	
Molybdenum, Mo	28.5 %	28.5 %	
Nickel, Ni	>= 65 %	>= 65 %	
Silicon, Si	<= 0.10 %	<= 0.10 %	
Titanium, Ti	<= 0.20 %	<= 0.20 %	
Tungsten, W	<= 3.0 %	<= 3.0 %	

Electrical Properties	Metric	English	Comments
Electrical Resistivity	0.000137 ohm-cm	0.000137 ohm-cm	RT
	0.000130 ohm-cm @Temperature 1000 °C	0.000130 ohm-cm @Temperature 1830 °F	
	0.000132 ohm-cm @Temperature 900 °C	0.000132 ohm-cm @Temperature 1650 °F	
	0.000137 ohm-cm @Temperature 800 °C	0.000137 ohm-cm @Temperature 1470 °F	
	0.000137 ohm-cm @Temperature 100 °C	0.000137 ohm-cm @Temperature 212 °F	
	0.000137 ohm-cm @Temperature 200 °C	0.000137 ohm-cm @Temperature 392 °F	
	0.000138 ohm-cm @Temperature 300 °C	0.000138 ohm-cm @Temperature 572 °F	
	0.000138 ohm-cm @Temperature 400 °C	0.000138 ohm-cm @Temperature 752 °F	
	0.000140 ohm-cm @Temperature 500 °C	0.000140 ohm-cm @Temperature 932 °F	
	0.000142 ohm-cm @Temperature 700 °C	0.000142 ohm-cm @Temperature 1290 °F	

Electrical Properties	Metric	English	Comments
	0.000143 ohm-cm @Temperature 600 °C	0.000143 ohm-cm @Temperature 1110 °F	

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