Special Metals NIMONIC® alloy 91 Ni-Cr-Co Alloy

Category : Metal , Nonferrous Metal , Cobalt Alloy , Nickel Alloy

Material Notes:

NIMONIC® alloy 91 is a wrought nickel-chromium-cobalt based alloy strengthened by additions of aluminum and titanium.This alloy is a modification of NIMONIC alloy 90, but has an increased chromium content to improve corrosion resistance in salt and sulfur contaminated environments. The alloy is suitable for long service up to about 900°C. It combines good strength and ductility with stability of microstructure and excellent resistance to hot corrosion.NIMONIC alloy 91 is intended for high-temperature stressed parts such as blades in gas turbines, burning impure fuels or operating in marine environments.Information Provided by Special Metals Corporation

Order this product through the following link:
http://www.lookpolymers.com/polymer_Special-Metals-NIMONIC-alloy-91-Ni-Cr-Co-Alloy.php

Physical Properties	Metric	English	Comments
Density	8.08 g/cc	0.292 lb/in³	

Mechanical Properties	Metric	English	Comments
Tensile Strength at Break	96.0 MPa @Temperature 1000 °C	13900 psi @Temperature 1830 °F	
	365 MPa @Temperature 900 °C	52900 psi @Temperature 1650 °F	
	644 MPa @Temperature 800 °C	93400 psi @Temperature 1470 °F	
	947 MPa @Temperature 700 °C	137000 psi @Temperature 1290 °F	
	993 MPa @Temperature 600 °C	144000 psi @Temperature 1110 °F	
	1001 MPa @Temperature 400 °C	145200 psi @Temperature 752 °F	
	1126 MPa @Temperature 200 °C	163300 psi @Temperature 392 °F	
	1180 MPa @Temperature 20.0 °C	171000 psi @Temperature 68.0 °F	
Tensile Strength, Yield	59.0 MPa @Strain 0.100 %, Temperature 1000 °C	8560 psi @Strain 0.100 %, Temperature 1830 °F	

Mechanical Properties	Metric	English	Comments
	@Strain 0.200 %, Temperature 1000 °C	@Strain 0.200 %, Temperature 1830 °F	
	293 MPa @Strain 0.100 %, Temperature 900 °C	42500 psi @Strain 0.100 %, Temperature 1650 °F	
	315 MPa @Strain 0.200 %, Temperature 900 °C	45700 psi @Strain 0.200 %, Temperature 1650 °F	
	530 MPa @Strain 0.100 %, Temperature 600 °C	76900 psi @Strain 0.100 %, Temperature 1110 °F	
	533 MPa @Strain 0.100 %, Temperature 400 °C	77300 psi @Strain 0.100 %, Temperature 752 °F	
	535 MPa @Strain 0.100 %, Temperature 800 °C	77600 psi @Strain 0.100 %, Temperature 1470 °F	
	544 MPa @Strain 0.200 %, Temperature 400 °C	78900 psi @Strain 0.200 %, Temperature 752 °F	
	547 MPa @Strain 0.200 %, Temperature 600 °C	79300 psi @Strain 0.200 %, Temperature 1110 °F	
	556 MPa @Strain 0.200 %, Temperature 800 °C	80600 psi @Strain 0.200 %, Temperature 1470 °F	
	561 MPa @Strain 0.100 %, Temperature 700 °C	81400 psi @Strain 0.100 %, Temperature 1290 °F	
	581 MPa @Strain 0.200 %, Temperature 700 °C	84300 psi @Strain 0.200 %, Temperature 1290 °F	
	599 MPa @Strain 0.100 %, Temperature 200 °C	86900 psi @Strain 0.100 %, Temperature 392 °F	
	610 MPa	88500 psi	

Mechanical Properties	Metric	English	Comments
	@Strain 0.200 %, Temperature 200 °C	@Strain 0.200 %, Temperature 392 °F	
	657 MPa @Strain 0.100 %, Temperature 20.0 °C	95300 psi @Strain 0.100 %, Temperature 68.0 °F	
	663 MPa @Strain 0.200 %, Temperature 20.0 °C	96200 psi @Strain 0.200 %, Temperature 68.0 °F	
Elongation at Break	21.6 % @Temperature 600 °C	21.6 % @Temperature 1110 °F	
	22.4 % @Temperature 900 °C	22.4 % @Temperature 1650 °F	
	25.6 % @Temperature 800 °C	25.6 % @Temperature 1470 °F	
	28 % @Temperature 700 °C	28 % @Temperature 1290 °F	
	28 % @Temperature 400 °C	28 % @Temperature 752 °F	
	29.6 % @Temperature 200 °C	29.6 % @Temperature 392 °F	
	31.2 % @Temperature 20.0 °C	31.2 % @Temperature 68.0 °F	
	137.8 % @Temperature 1000 °C	137.8 % @Temperature 1830 °F	
Reduction of Area	23.5 % @Temperature 600 °C	23.5 % @Temperature 1110 °F	
	24.2 % @Temperature 900 °C	24.2 % @Temperature 1650 °F	
	24.9 % @Temperature 800 °C	24.9 % @Temperature 1470 °F	
	26.6 % @Temperature 400 °C	26.6 % @Temperature 752 °F	
	27.9 %	27.9 %	

Mechanical Properties	Metric	English	Comments
	@Temperature 700 °C	@Temperature 1290 °F	
	29.3 % @Temperature 20.0 °C	29.3 % @Temperature 68.0 °F	
	31.5 % @Temperature 200 °C	31.5 % @Temperature 392 °F	
	98 % @Temperature 1000 °C	98 % @Temperature 1830 °F	
Rupture Strength	139 MPa @Temperature 870 °C, Time 533000 sec	20200 psi @Temperature 1600 °F, Time 148 hour	cold-rolled; 12.8% elongation
	250 MPa @Temperature 815 °C, Time 338000 sec	36300 psi @Temperature 1500 °F, Time 94.0 hour	forged; 8.4% elong
	386 MPa @Temperature 750 °C, Time 266000 sec	56000 psi @Temperature 1380 °F, Time 74.0 hour	forged; 4.4% elong
Modulus of Elasticity	132 GPa @Temperature 900 °C	19100 ksi @Temperature 1650 °F	
	149 GPa @Temperature 700 °C	21600 ksi @Temperature 1290 °F	
	163 GPa @Temperature 500 °C	23600 ksi @Temperature 932 °F	
	195 GPa @Temperature 300 °C	28300 ksi @Temperature 572 °F	
	204 GPa @Temperature 100 °C	29600 ksi @Temperature 212 °F	
	222 GPa @Temperature 20.0 °C	32200 ksi @Temperature 68.0 °F	
Impact Test	16.3 J @Temperature 750 °C, Time 7.27e+6 sec	12.0 ft-lb @Temperature 1380 °F, Time 2020 hour	Soaking Time: 2020 hours at 750°C
	32.5 - 38.0 J	24.0 - 28.0 ft-lb	

Mechanical Properties	Metric	English	Comments
	@Treatment Temp. 850 C, Time 3.60e+6 sec	@Treatment Temp. 1562 F, Time 1000 hour	Soaking Time: 1000 hours at 850°C

Thermal Properties	Metric	English	Comments
Specific Heat Capacity	0.447 J/g-°C @Temperature 20.0 °C	0.107 BTU/lb-°F @Temperature 68.0 °F	
	0.468 J/g-°C @Temperature 100 °C	0.112 BTU/lb-°F @Temperature 212 °F	
	0.521 J/g-°C @Temperature 300 °C	0.125 BTU/lb-°F @Temperature 572 °F	
	0.574 J/g-°C @Temperature 500 °C	0.137 BTU/lb-°F @Temperature 932 °F	
	0.627 J/g-°C @Temperature 700 °C	0.150 BTU/lb-°F @Temperature 1290 °F	
	0.680 J/g-°C @Temperature 900 °C	0.163 BTU/lb-°F @Temperature 1650 °F	
Melting Point	>= 1300 °C	>= 2370 °F	
	1350 °C	2460 °F	
Solidus	1300 °C	2370 °F	
Liquidus	1350 °C	2460 °F	

Component Elements Properties	Metric	English	Comments
Aluminum, Al	0.90 - 1.5 %	0.90 - 1.5 %	
Boron, B	0.0020 - 0.010 %	0.0020 - 0.010 %	
Carbon, C	<= 0.10 %	<= 0.10 %	
Chromium, Cr	27 - 30 %	27 - 30 %	
Cobalt, Co	19 - 21 %	19 - 21 %	
Copper, Cu	<= 0.50 %	<= 0.50 %	
Iron, Fe	<= 1.0 %	<= 1.0 %	
Manganese, Mn	<= 1.0 %	<= 1.0 %	
Nickel, Ni	39.99 - 50.798 %	39.99 - 50.798 %	Balance

Component Elements Properties	Metric	English	Comments
Molybdenum, Mo (Columbium, Cb)	0.90 - 1.1 %	0.90 - 1.1 %	
Silicon, Si	<= 1.0 %	<= 1.0 %	
Titanium, Ti	1.9 - 2.7 %	1.9 - 2.7 %	
Zirconium, Zr	<= 0.10 %	<= 0.10 %	

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