

Special Metals INCOLOY® alloy 890 Ni-Cr-Fe Superalloy

Category : Metal , Nonferrous Metal , Nickel Alloy , Superalloy

Material Notes:

INCOLOY® alloy 890 (UNS N08890) is the latest addition to the INCOLOY alloy family of heat resistant alloys. Alloy 890 joins the existing INCOLOY products in offering high strength along with excellent resistance to oxidation, carburization, and sulfidation at temperatures up to 2200°F (1200°C). Alloy 890 offers the high chromium content of alloy 803 along with enhanced properties from additions of silicon, molybdenum, and niobium. Alloy 890 is protected by US Patent number 5,873,950 dated February 23, 1999. Information Provided by Special Metals Corporation

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http://www.lookpolymers.com/polymer_Special-Metals-INCOLOY-alloy-890-Ni-Cr-Fe-Superalloy.php

Physical Properties	Metric	English	Comments
Density	7.94 g/cc	0.287 lb/in ³	

Mechanical Properties	Metric	English	Comments
Tensile Strength, Ultimate	62.0 MPa	8990 psi	Hot-Rolled Plate, Solution-Annealed
	@Temperature 1100 °C	@Temperature 2010 °F	
	92.0 MPa	13300 psi	
	@Temperature 980 °C	@Temperature 1800 °F	Hot-Rolled Plate, Solution-Annealed
	132 MPa	19100 psi	Hot-Rolled Plate, Solution-Annealed
	@Temperature 870 °C	@Temperature 1600 °F	
	652 MPa	94600 psi	Hot-Rolled Plate, Solution-Annealed
	@Temperature 22.0 °C	@Temperature 71.6 °F	
	652 MPa	94600 psi	Cold-Drawn Tubing, Solution-Annealed
	@Temperature 22.0 °C	@Temperature 71.6 °F	
Tensile Strength, Yield	44.0 MPa	6380 psi	Hot-Rolled Plate, Solution-Annealed
	@Strain 0.200 %, Temperature 1100 °C	@Strain 0.200 %, Temperature 2010 °F	
	66.0 MPa	9570 psi	
	@Strain 0.200 %, Temperature 980 °C	@Strain 0.200 %, Temperature 1800 °F	Hot-Rolled Plate, Solution-Annealed
	110 MPa	16000 psi	Hot-Rolled Plate, Solution-Annealed

Mechanical Properties	Metric @Strain 0.200 %, Temperature 870 Å°C	English @Strain 0.200 %, Temperature 1600 Å°F	Comments
	272 MPa @Strain 0.200 %, Temperature 22.0 Å°C	39500 psi @Strain 0.200 %, Temperature 71.6 Å°F	Hot-Rolled Plate, Solution-Annealed
	334 MPa @Strain 0.200 %, Temperature 22.0 Å°C	48400 psi @Strain 0.200 %, Temperature 71.6 Å°F	Cold-Drawn Tubing, Solution-Annealed
Elongation at Break	46.5 % @Temperature 22.0 Å°C	46.5 % @Temperature 71.6 Å°F	Cold-Drawn Tubing, Solution-Annealed
	46.6 % @Temperature 22.0 Å°C	46.6 % @Temperature 71.6 Å°F	Hot-Rolled Plate, Solution-Annealed
	83.6 % @Temperature 1100 Å°C	83.6 % @Temperature 2010 Å°F	Hot-Rolled Plate, Solution-Annealed
	84.8 % @Temperature 870 Å°C	84.8 % @Temperature 1600 Å°F	Hot-Rolled Plate, Solution-Annealed
	98 % @Temperature 980 Å°C	98 % @Temperature 1800 Å°F	Hot-Rolled Plate, Solution-Annealed
Reduction of Area	60.1 % @Temperature 22.0 Å°C	60.1 % @Temperature 71.6 Å°F	Cold-Drawn Tubing, Solution-Annealed
	62.7 % @Temperature 22.0 Å°C	62.7 % @Temperature 71.6 Å°F	Hot-Rolled Plate, Solution-Annealed
	71 % @Temperature 870 Å°C	71 % @Temperature 1600 Å°F	Hot-Rolled Plate, Solution-Annealed
	87.5 % @Temperature 980 Å°C	87.5 % @Temperature 1800 Å°F	Hot-Rolled Plate, Solution-Annealed
	91.8 % @Temperature 1100 Å°C	91.8 % @Temperature 2010 Å°F	Hot-Rolled Plate, Solution-Annealed

Mechanical Properties <i>Modulus of Elasticity</i>	128.5 GPa Metric	20100 ksi English	Comments
	@Temperature 900 Â°C	@Temperature 1650 Â°F	
	151.7 GPa	22000 ksi	
	@Temperature 700 Â°C	@Temperature 1290 Â°F	
	166.9 GPa	24210 ksi	
	@Temperature 500 Â°C	@Temperature 932 Â°F	
	180 GPa	26100 ksi	
	@Temperature 300 Â°C	@Temperature 572 Â°F	
	191 GPa	27700 ksi	
	@Temperature 100 Â°C	@Temperature 212 Â°F	
	195.1 GPa	28300 ksi	
	@Temperature 22.0 Â°C	@Temperature 71.6 Â°F	
Poissons Ratio	0.301	0.301	
	@Temperature 500 Â°C	@Temperature 932 Â°F	
	0.31	0.31	
	@Temperature 700 Â°C	@Temperature 1290 Â°F	
	0.318	0.318	
	@Temperature 300 Â°C	@Temperature 572 Â°F	
	0.319	0.319	
	@Temperature 100 Â°C	@Temperature 212 Â°F	
	0.322	0.322	
	@Temperature 22.0 Â°C	@Temperature 71.6 Â°F	
	0.377	0.377	
	@Temperature 900 Â°C	@Temperature 1650 Â°F	
Shear Modulus	50.3 GPa	7300 ksi	
	@Temperature 900 Â°C	@Temperature 1650 Â°F	
	57.9 GPa	8400 ksi	
	@Temperature 700 Â°C	@Temperature 1290	

Mechanical Properties	Metric	English	Comments
	84.1 GPa	9988 ksi	
	@Temperature 500 Â°C	@Temperature 932 Â°F	
	68.3 GPa	9910 ksi	
	@Temperature 300 Â°C	@Temperature 572 Â°F	
	72.4 GPa	10500 ksi	
	@Temperature 100 Â°C	@Temperature 212 Â°F	
	73.8 GPa	10700 ksi	
	@Temperature 22.0 Â°C	@Temperature 71.6 Â°F	

Thermal Properties	Metric	English	Comments
CTE, linear	14.47 Âµm/m-Â°C	8.039 Âµin/in-Â°F	
	@Temperature 100 Â°C	@Temperature 212 Â°F	
	15.11 Âµm/m-Â°C	8.394 Âµin/in-Â°F	
	@Temperature 300 Â°C	@Temperature 572 Â°F	
	15.94 Âµm/m-Â°C	8.856 Âµin/in-Â°F	
	@Temperature 500 Â°C	@Temperature 932 Â°F	
	16.88 Âµm/m-Â°C	9.378 Âµin/in-Â°F	
	@Temperature 700 Â°C	@Temperature 1290 Â°F	
Melting Point	1309 - 1383 Â°C	2388 - 2521 Â°F	
Solidus	1309 Â°C	2388 Â°F	
Liquidus	1383 Â°C	2521 Â°F	

Component Elements Properties	Metric	English	Comments
Aluminum, Al	0.10 %	0.10 %	
Carbon, C	0.10 %	0.10 %	
Chromium, Cr	25 %	25 %	
Copper, Cu	<= 0.75 %	<= 0.75 %	
Iron, Fe	25.605 - 28.4 %	25.605 - 28.4 %	Balance
Manganese, Mn	<= 1.0 %	<= 1.0 %	

Molybdenum, Mo Component Elements Properties	1.5 % Metric	1.5 % English	Comments
Nickel, Ni	42.5 %	42.5 %	
Niobium, Nb (Columbium, Cb)	0.40 %	0.40 %	
Phosphorous, P	<= 0.030 %	<= 0.030 %	
Silicon, Si	1.8 %	1.8 %	
Sulfur, S	<= 0.015 %	<= 0.015 %	
Tantalum, Ta	0.20 %	0.20 %	
Titanium, Ti	<= 1.0 %	<= 1.0 %	

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