

Special Metals INCOLOY® Alloy 903

Category : Metal , Superalloy , Iron Base

Material Notes:

A nickel-iron-cobalt alloy with additions of niobium, titanium, and aluminum for precipitation hardening. The alloy combines high strength with a low and constant coefficient of thermal expansion at temperatures to about 800°F (430°C). It also has a constant modulus of elasticity and is highly resistant to thermal fatigue and thermal shock. Used in gas turbines for rings and casings. Standard product forms are round, flats, forging stock, sheet, and wire. Data provided by the manufacturer, Special Metals.

Order this product through the following link:

http://www.lookpolymers.com/polymer_Special-Metals-INCOLOY-Alloy-903.php

Physical Properties	Metric	English	Comments
Density	8.25 g/cc	0.298 lb/in ³	

Mechanical Properties	Metric	English	Comments
Tensile Strength, Ultimate	1310 MPa	190000 psi	Precipitation Hardened
Tensile Strength, Yield	1100 MPa @Strain 0.200 %	160000 psi @Strain 0.200 %	Precipitation Hardened
Elongation at Break	14 %	14 %	Precipitation Hardened
Modulus of Elasticity	146.8 GPa @Temperature 0.000 °C	21290 ksi @Temperature 32.0 °F	
	146.9 GPa @Temperature -50.0 °C	21310 ksi @Temperature -58.0 °F	
	146.9 GPa @Temperature 50.0 °C	21310 ksi @Temperature 122 °F	
	147.2 GPa @Temperature 100 °C	21350 ksi @Temperature 212 °F	
	147.4 GPa @Temperature -100 °C	21380 ksi @Temperature -148 °F	
	147.8 GPa @Temperature 150 °C	21440 ksi @Temperature 302 °F	
	148.4 GPa @Temperature 200 °C	21520 ksi @Temperature 392 °F	
	148.9 GPa	21600 ksi	

Mechanical Properties	Metric @ Temperature -195 °C	English @ Temperature -319 °F	Comments
	149.3 GPa	21650 ksi	
	@Temperature 250 °C	@Temperature 482 °F	
	149.8 GPa	21730 ksi	
	@Temperature 600 °C	@Temperature 1110 °F	
	150.2 GPa	21790 ksi	
	@Temperature 300 °C	@Temperature 572 °F	
	151.3 GPa	21940 ksi	
	@Temperature 350 °C	@Temperature 662 °F	
	151.8 GPa	22020 ksi	
	@Temperature 550 °C	@Temperature 1020 °F	
	152.4 GPa	22100 ksi	
	@Temperature 400 °C	@Temperature 752 °F	
	153.5 GPa	22260 ksi	
	@Temperature 450 °C	@Temperature 842 °F	
	153.9 GPa	22320 ksi	
	@Temperature 500 °C	@Temperature 932 °F	
Poissons Ratio	0.226	0.226	
	@Temperature 250 °C	@Temperature 482 °F	
	0.227	0.227	
	@Temperature 300 °C	@Temperature 572 °F	
	0.231	0.231	
	@Temperature 200 °C	@Temperature 392 °F	
	0.236	0.236	
	@Temperature 350 °C	@Temperature 662 °F	
	0.239	0.239	
	@Temperature 50.0 °C	@Temperature 122 °F	
	0.241	0.241	
	@Temperature 400 °C	@Temperature 752 °F	
	0.242	0.242	
	@Temperature 150 °C	@Temperature 302 °F	

Mechanical Properties	Metric	English	Comments
	@Temperature 100 °C	@Temperature 212 °F	
	0.273	0.273	
	@Temperature 450 °C	@Temperature 842 °F	
	0.30	0.30	
	@Temperature 500 °C	@Temperature 932 °F	
	0.318	0.318	
	@Temperature 550 °C	@Temperature 1020 °F	
	0.352	0.352	
	@Temperature 600 °C	@Temperature 1110 °F	
Shear Modulus	55.4 GPa	8040 ksi	
	@Temperature 600 °C	@Temperature 1110 °F	
	57.6 GPa	8350 ksi	
	@Temperature 550 °C	@Temperature 1020 °F	
	59.0 GPa	8560 ksi	
	@Temperature 100 °C	@Temperature 212 °F	
	59.2 GPa	8590 ksi	
	@Temperature 500 °C	@Temperature 932 °F	
	59.3 GPa	8600 ksi	
	@Temperature 50.0 °C	@Temperature 122 °F	
	59.5 GPa	8630 ksi	
	@Temperature 150 °C	@Temperature 302 °F	
	60.3 GPa	8750 ksi	
	@Temperature 200 °C	@Temperature 392 °F	
	60.3 GPa	8750 ksi	
	@Temperature 450 °C	@Temperature 842 °F	
	60.9 GPa	8830 ksi	
	@Temperature 250 °C	@Temperature 482 °F	
	61.2 GPa	8880 ksi	
	@Temperature 300 °C	@Temperature 572 °F	

Mechanical Properties	61.2 GPa Metric	8880 ksi English	Comments
	@Temperature 350 °C	@Temperature 662 °F	
	61.4 GPa	8910 ksi	
	@Temperature 400 °C	@Temperature 752 °F	

Thermal Properties	Metric	English	Comments
CTE, linear	7.65 µm/m-°C	4.25 µin/in-°F	
	@Temperature 25.0 - 427 °C	@Temperature 77.0 - 801 °F	
Specific Heat Capacity	0.435 J/g-°C	0.104 BTU/lb-°F	test temperature not reported
	0.442 J/g-°C	0.106 BTU/lb-°F	
	@Temperature 50.0 °C	@Temperature 122 °F	
	0.454 J/g-°C	0.109 BTU/lb-°F	
	@Temperature 100 °C	@Temperature 212 °F	
	0.482 J/g-°C	0.115 BTU/lb-°F	
	@Temperature 200 °C	@Temperature 392 °F	
	0.507 J/g-°C	0.121 BTU/lb-°F	
	@Temperature 300 °C	@Temperature 572 °F	
	0.532 J/g-°C	0.127 BTU/lb-°F	
@Temperature 400 °C	@Temperature 752 °F		
0.559 J/g-°C	0.134 BTU/lb-°F		
@Temperature 500 °C	@Temperature 932 °F		
0.584 J/g-°C	0.140 BTU/lb-°F		
@Temperature 600 °C	@Temperature 1110 °F		
Thermal Conductivity	16.7 W/m-K	116 BTU-in/hr-ft ² -°F	test temperature unknown
	16.9 W/m-K	117 BTU-in/hr-ft ² -°F	
	@Temperature 50.0 °C	@Temperature 122 °F	
	17.2 W/m-K	119 BTU-in/hr-ft ² -°F	
	@Temperature 100 °C	@Temperature 212 °F	
	17.9 W/m-K	124 BTU-in/hr-ft ² -°F	
@Temperature 200 °C	@Temperature 392 °F		
	18.3 W/m-K	127 BTU-in/hr-ft ² -°F	

Thermal Properties	@Temperature 300 °C Metric	@Temperature 572 °F English	Comments
	19.0 W/m-K	132 BTU-in/hr-ft ² -°F	
	@Temperature 400 °C	@Temperature 752 °F	
	20.3 W/m-K	141 BTU-in/hr-ft ² -°F	
	@Temperature 500 °C	@Temperature 932 °F	
	21.9 W/m-K	152 BTU-in/hr-ft ² -°F	
	@Temperature 600 °C	@Temperature 1110 °F	

Electrical Properties	Metric	English	Comments
Electrical Resistivity	0.0000610 ohm-cm	0.0000610 ohm-cm	
	0.0000650 ohm-cm	0.0000650 ohm-cm	
	@Temperature 50.0 °C	@Temperature 122 °F	
	0.0000735 ohm-cm	0.0000735 ohm-cm	
	@Temperature 100 °C	@Temperature 212 °F	
	0.0000880 ohm-cm	0.0000880 ohm-cm	
	@Temperature 200 °C	@Temperature 392 °F	
	0.000102 ohm-cm	0.000102 ohm-cm	
	@Temperature 300 °C	@Temperature 572 °F	
	0.0001135 ohm-cm	0.0001135 ohm-cm	
	@Temperature 400 °C	@Temperature 752 °F	
	0.0001195 ohm-cm	0.0001195 ohm-cm	
	@Temperature 500 °C	@Temperature 932 °F	
	0.000122 ohm-cm	0.000122 ohm-cm	
	@Temperature 600 °C	@Temperature 1110 °F	
Curie Temperature	415 - 470 °C	779 - 878 °F	

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