

Crucible Steel 17Cr-4Ni Super-X® Precipitation Hardening Stainless Steel

Category : Metal , Ferrous Metal , Martensitic , Stainless Steel , Precipitation Hardening Stainless

Material Notes:

Crucible 17Cr-4Ni is a version of 17CR-4Ni which has been modified to substantially improve machinability and other properties. Patented 17Cr-4Ni Super-X meets industry specifications for 17Cr-4Ni. The machinability improvement, of up to 45% over conventional solution-treated (Condition A) 17Cr-4Ni material, has been achieved by close control of the chemical composition within the standard range. Crucible 17Cr-4Ni shows a significant improvement in ductility in all conditions, especially the solution-treated condition. In addition, the steel is markedly tougher than conventional 17Cr-4Ni as measured by Charpy impact tests. Crucible 17Cr-4Ni Super-X is a precipitation-hardening stainless steel which is capable of a high strength and hardness levels after a relatively simple heat-treatment procedure. This grade is martensitic and magnetic in both the solution-treated and precipitation-hardened conditions. It has high resistance to crack propagation, good transverse properties, and corrosion resistance is normally superior to the regular martensitic chromium-type of stainless steel. Because of the single low-temperature (900-1150°F) precipitation-hardening heat treatment of this grade, scaling and distortion are virtually eliminated. This enables materials to be finish machined to close tolerance prior to heat treatment. Information provided by Crucible Specialty Metals.

Order this product through the following link:

http://www.lookpolymers.com/polymer_Crucible-Steel-17Cr-4Ni-Super-X-Precipitation-Hardening-Stainless-Steel.php

Physical Properties	Metric	English	Comments
Density	7.75 g/cc	0.280 lb/in ³	A
	7.86 g/cc	0.284 lb/in ³	H1150

Mechanical Properties	Metric	English	Comments
Hardness, Brinell	302	302	A
	332	332	H1100
	409	409	H925
Hardness, Rockwell C	27	27	H1150-M
	36	36	H1075
	44	44	H900
Tensile Strength, Ultimate	862 MPa	125000 psi	H1150-M
	931 MPa	135000 psi	A
	1170 MPa	170000 psi	H1025
	662 MPa @Temperature 538 °C	96000 psi @Temperature 1000 °F	H1150

Mechanical Properties	820 MPa Metric	119000 psi English	Comments
	@Temperature 538 °C	@Temperature 1000 °F	
	855 MPa	124000 psi	H1150
	@Temperature 316 °C	@Temperature 600 °F	
	1190 MPa	173000 psi	H900
	@Temperature 316 °C	@Temperature 600 °F	
Tensile Strength, Yield	862 MPa	125000 psi	H1150
	@Strain 0.200 %	@Strain 0.200 %	
	1030 MPa	150000 psi	H1075
	@Strain 0.200 %	@Strain 0.200 %	
	1280 MPa	185000 psi	H900
	@Strain 0.200 %	@Strain 0.200 %	
	641 MPa	93000 psi	H1150
	@Strain 2.00 %, Temperature 538 °C	@Strain 2.00 %, Temperature 1000 °F	
	731 MPa	106000 psi	H900
	@Strain 2.00 %, Temperature 538 °C	@Strain 2.00 %, Temperature 1000 °F	
	827 MPa	120000 psi	H1150
	@Strain 2.00 %, Temperature 316 °C	@Strain 2.00 %, Temperature 600 °F	
	1030 MPa	150000 psi	H900
	@Strain 2.00 %, Temperature 316 °C	@Strain 2.00 %, Temperature 600 °F	
Elongation at Break	15 %	15 %	in 2", A
	17.5 %	17.5 %	in 2", H1025
	24 %	24 %	in 2", H1150-M
	10 %	10 %	in 2"; H900
	@Temperature 316 °C	@Temperature 600 °F	
	12 %	12 %	in 2", H1150
	@Temperature 316 °C	@Temperature 600 °F	
	15 %	15 %	in 2"; H900
	@Temperature 538 °C	@Temperature 1000 °F	

Mechanical Properties	Metric	English	Comments
	@Temperature 538 °C	@Temperature 1000 °F	H1150
Reduction of Area	60 %	60 %	H900
	62 %	62 %	H925
	67 %	67 %	H1100
	31 %	31 %	H900
	@Temperature 316 °C	@Temperature 600 °F	
	46 %	46 %	H900
	@Temperature 538 °C	@Temperature 1000 °F	
	54 %	54 %	H1150
	@Temperature 316 °C	@Temperature 600 °F	
	55 %	55 %	H1150
	@Temperature 538 °C	@Temperature 1000 °F	
Rupture Strength	413.7 MPa	60000 psi	
	@Temperature 32.2 °C, Time 3.60e+6 sec	@Temperature 90.0 °F, Time 1000 hour	
	655.0 MPa	95000 psi	
	@Temperature 482 °C, Time 360000 sec	@Temperature 900 °F, Time 100 hour	
	1089 MPa	158000 psi	
	@Temperature 316 °C, Time 3.60e+6 sec	@Temperature 600 °F, Time 1000 hour	
	1131 MPa	164000 psi	
	@Temperature 316 °C, Time 360000 sec	@Temperature 600 °F, Time 100 hour	
Modulus of Elasticity	197 GPa	28500 ksi	Tension; H900
Fatigue Strength	531 MPa	77000 psi	
	@# of Cycles 1.00e+8	@# of Cycles 1.00e+8	
	621 MPa	90000 psi	
	@# of Cycles 1.00e+7	@# of Cycles 1.00e+7	
Shear Modulus	68.9 GPa	10000 ksi	H1075 and H1150
	77.2 GPa	11200 ksi	H900

Charpy Impact Mechanical Properties	136 J Metric	100 ft-lb English	H900 Comments
	169 J	125 ft-lb	H1150-M

Thermal Properties	Metric	English	Comments
CTE, linear	10.8 $\mu\text{m}/\text{m}\cdot^\circ\text{C}$	6.00 $\mu\text{in}/\text{in}\cdot^\circ\text{F}$	A and H900
	@Temperature 21.1 - 93.3 $^\circ\text{C}$	@Temperature 70.0 - 200 $^\circ\text{F}$	
	11.3 $\mu\text{m}/\text{m}\cdot^\circ\text{C}$	6.30 $\mu\text{in}/\text{in}\cdot^\circ\text{F}$	H1075
	@Temperature 21.1 - 93.3 $^\circ\text{C}$	@Temperature 70.0 - 200 $^\circ\text{F}$	
	11.3 $\mu\text{m}/\text{m}\cdot^\circ\text{C}$	6.30 $\mu\text{in}/\text{in}\cdot^\circ\text{F}$	A
	@Temperature 21.1 - 427 $^\circ\text{C}$	@Temperature 70.0 - 800 $^\circ\text{F}$	
	11.9 $\mu\text{m}/\text{m}\cdot^\circ\text{C}$	6.60 $\mu\text{in}/\text{in}\cdot^\circ\text{F}$	H1150
	@Temperature 21.1 - 93.3 $^\circ\text{C}$	@Temperature 70.0 - 200 $^\circ\text{F}$	
	13.0 $\mu\text{m}/\text{m}\cdot^\circ\text{C}$	7.20 $\mu\text{in}/\text{in}\cdot^\circ\text{F}$	H1150
	@Temperature 21.1 - 427 $^\circ\text{C}$	@Temperature 70.0 - 800 $^\circ\text{F}$	
Specific Heat Capacity	0.460 J/g- $^\circ\text{C}$	0.110 BTU/lb- $^\circ\text{F}$	
	@Temperature 0.000 - 100 $^\circ\text{C}$	@Temperature 32.0 - 212 $^\circ\text{F}$	
Thermal Conductivity	17.9 W/m-K	124 BTU-in/hr-ft 2 - $^\circ\text{F}$	H900
	@Temperature 149 $^\circ\text{C}$	@Temperature 300 $^\circ\text{F}$	
	22.6 W/m-K	157 BTU-in/hr-ft 2 - $^\circ\text{F}$	H900
	@Temperature 482 $^\circ\text{C}$	@Temperature 900 $^\circ\text{F}$	

Component Elements Properties	Metric	English	Comments
Carbon, C	0.020 %	0.020 %	
Chromium, Cr	15.25 %	15.25 %	
Copper, Cu	3.5 %	3.5 %	
Iron, Fe	75.07 %	75.07 %	As Remainder
Manganese, Mn	0.60 %	0.60 %	
Nb + Ta	0.20 %	0.20 %	

Component Elements Properties	Metric	English	Comments
Nitrogen, N	0.015 %	0.015 %	
Phosphorous, P	0.025 %	0.025 %	
Silicon, Si	0.50 %	0.50 %	
Sulfur, S	0.020 %	0.020 %	

Electrical Properties	Metric	English	Comments
Electrical Resistivity	0.0000770 ohm-cm	0.0000770 ohm-cm	H900
	0.0000980 ohm-cm	0.0000980 ohm-cm	A

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