

Carlson C 400 Nickel-Copper Alloy

Category : Metal , Nonferrous Metal , Nickel Alloy , Superalloy

Material Notes:

General Description Carlson Alloy C 400 is a nickel-copper alloy which provides an excellent combination of high strength, ductility, good weldability, and resistance to corrosion over a wide range of temperatures and conditions. C 400 exhibits high yield and tensile strengths during exposure to cryogenic temperatures. This alloy cannot be hardened by heat treatment, only by cold working. It is generally free from stress corrosion cracking. **Applications** C400 provides excellent service for marine applications, including continuous or intermittent exposure to high-velocity brackish or sea water. This alloy is also widely used for handling sulfuric acid under reducing conditions. It is one of the few materials that offer good resistance to hydrofluoric acid. C 400 can be utilized over a wide range of temperatures for fluorine, dry chlorine and hydrogen chloride service. It exhibits useful resistance to hydrochloric acid up to 10% concentrations at room temperature. This alloy however, has poor resistance to highly oxidizing acids such as nitric acid and nitrous acids. C400 exhibits excellent resistance to non-oxidizing halides and good resistance to neutral and alkaline salts such as carbonates, sulfates, nitrates, and acetates. **Chemical Processing Equipment** – heat exchangers, reactors and vessels; caustic evaporators; pumps, valves, and piping for processing hydrofluoric, hydrochloric and sulfuric acids, fluorine, dry chlorine, hydrogen chloride and hydrogen fluoride gasses, non-oxidizing halides and neutral alkaline salts. **Marine Components** – pumps, valves, piping, shafts and fixtures used in sea and brackish water. **Petroleum Refining** – crude distillation towers, accumulator tanks, condensers, isomerization units, hydrofluoric and sulfuric acid alkylation units, vessels, heat exchangers and piping. **Power Industry** – expansion bellows, feedwater heaters, other heat exchangers and cooling tower fans. **Electrical and Electronic Components.** Information provided by Carlson

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http://www.lookpolymers.com/polymer_Carlson-C-400-Nickel-Copper-Alloy.php

Physical Properties	Metric	English	Comments
Density	8.83 g/cc	0.319 lb/in ³	

Mechanical Properties	Metric	English	Comments
Tensile Strength at Break	>= 483 MPa	>= 70000 psi	Annealed
	517 MPa	75000 psi	as rolled
Tensile Strength, Yield	>= 193 MPa	>= 28000 psi	annealed
	@Strain 0.200 %	@Strain 0.200 %	
Elongation at Break	25 %	25 %	as rolled
	>= 35 %	>= 35 %	annealed
Modulus of Elasticity	179 GPa	26000 ksi	Tension
Poissons Ratio	0.32	0.32	

Mechanical Properties	Metric	English	Comments
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Thermal Properties	Metric	English	Comments
CTE, linear	13.9 $\mu\text{m}/\text{m}\cdot^\circ\text{C}$	7.70 $\mu\text{in}/\text{in}\cdot^\circ\text{F}$	
	@Temperature 21.1 - 93.3 $^\circ\text{C}$	@Temperature 70.0 - 200 $^\circ\text{F}$	
Specific Heat Capacity	0.502 J/g- $^\circ\text{C}$	0.120 BTU/lb- $^\circ\text{F}$	

Component Elements Properties	Metric	English	Comments
Carbon, C	$\leq 0.30\%$	$\leq 0.30\%$	
Copper, Cu	28 - 34 %	28 - 34 %	
Iron, Fe	$\leq 0.25\%$	$\leq 0.25\%$	
Manganese, Mn	$\leq 2.0\%$	$\leq 2.0\%$	
Nickel, Ni	$\geq 63\%$	$\geq 63\%$	
Silicon, Si	$\leq 0.50\%$	$\leq 0.50\%$	
Sulfur, S	$\leq 0.024\%$	$\leq 0.024\%$	

Electrical Properties	Metric	English	Comments
Electrical Resistivity	0.000104 ohm-cm	0.000104 ohm-cm	
Curie Temperature	-6.67 - 10.0 $^\circ\text{C}$	20.0 - 50.0 $^\circ\text{F}$	

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