

Carpenter Custom 450® Stainless Steel, Condition H950 (Age Hardened 510°C)

Category : Metal , Ferrous Metal , Stainless Steel , T 400 Series Stainless Steel

Material Notes:

Data provided by Carpenter Technology Corporation. Custom 450® stainless is a martensitic age-hardenable stainless steel which exhibits very good corrosion resistance (similar to that of Stainless Type 304) with moderate strength (similar to that of Stainless Type 410). the alloy has a yield strength somewhat greater than 100 ksi (689 MPa) in the annealed condition, but is easily fabricated. A single-step aging treatment develops higher strength with good ductility and toughness. This stainless can be machined, hot-worked, and cold-formed in the same manner as other martensitic age-hardenable stainless steels. A particular advantage is ease of welding and brazing. Custom 450 stainless is generally supplied in the annealed condition, requiring no heat treatment by the user for many applications. Because it has corrosion resistance like Type 304 stainless but three times the yield strength, it has been used in applications where Type 304 was not strong enough. On the other hand, it has also replaced Type 410 stainless directly on a strength basis where Type 410 had insufficient corrosion resistance. Mechanical properties will depend on the aging temperature selected. Custom 450® is a registered trademark of Carpenter Technology Corporation.

Order this product through the following link:

http://www.lookpolymers.com/polymer_Carpenter-Custom-450-Stainless-Steel-Condition-H950-Age-Hardened-510C.php

Physical Properties	Metric	English	Comments
Density	7.76 g/cc	0.280 lb/in ³	H900 Condition

Mechanical Properties	Metric	English	Comments
Hardness, Brinell	384	384	Estimated from Rockwell C for 3000 kg load, 10 mm ball Brinell measurement.
Hardness, Knoop	420	420	Estimated from Rockwell C
Hardness, Rockwell C	41.5	41.5	
Hardness, Vickers	402	402	Estimated from Rockwell C
Tensile Strength, Ultimate	1289 MPa	187000 psi	
	586 MPa	85000 psi	
	@Temperature 566 °C	@Temperature 1050 °F	
	986 MPa	143000 psi	
	@Temperature 427 °C	@Temperature 801 °F	
	1048 MPa	152000 psi	
	@Temperature 316 °C	@Temperature 601 °F	
Tensile Strength, Yield	1264 MPa	183300 psi	
	@Strain 0.200 %	@Strain 0.200 %	

Mechanical Properties	538 MPa Metric	78000 psi English	Comments
	@Strain 0.200 %, Temperature 566 °C	@Strain 0.200 %, Temperature 1050 °F	
	896 MPa	130000 psi	
	@Strain 0.200 %, Temperature 427 °C	@Strain 0.200 %, Temperature 801 °F	
	965 MPa	140000 psi	
	@Strain 0.200 %, Temperature 316 °C	@Strain 0.200 %, Temperature 601 °F	
Elongation at Break	16 %	16 %	In 4D
	12 %	12 %	In 4D
	@Temperature 427 °C	@Temperature 801 °F	
	12 %	12 %	In 4D
	@Temperature 316 °C	@Temperature 601 °F	
	27 %	27 %	
	@Temperature 566 °C	@Temperature 1050 °F	
Reduction of Area	58 %	58 %	
	45 %	45 %	
	@Temperature 427 °C	@Temperature 801 °F	
	49 %	49 %	
	@Temperature 316 °C	@Temperature 601 °F	
Modulus of Elasticity	200 GPa	29000 ksi	
Notched Tensile Strength	1986 MPa	288000 psi	$K_{t} = 10$
Poissons Ratio	0.29	0.29	
Shear Modulus	77.5 GPa	11200 ksi	Calculated
Charpy Impact	64.0 J	47.2 ft-lb	V-notch
	68.0 J	50.2 ft-lb	V-notch
	@Temperature 316 °C	@Temperature 601 °F	
	73.0 J	53.8 ft-lb	V-notch
	@Temperature 427 °C	@Temperature 801 °F	
	91.0 J	67.1 ft-lb	V-notch
	@Temperature 566 °C	@Temperature 1050 °F	

Thermal Properties	Metric	English	Comments
CTE, linear	10.8 $\mu\text{m}/\text{m}\cdot^\circ\text{C}$	6.00 $\mu\text{in}/\text{in}\cdot^\circ\text{F}$	H900 Condition
	@Temperature 24.0 - 93.0 $^\circ\text{C}$	@Temperature 75.2 - 199 $^\circ\text{F}$	
	10.87 $\mu\text{m}/\text{m}\cdot^\circ\text{C}$	6.039 $\mu\text{in}/\text{in}\cdot^\circ\text{F}$	H900 Condition
	@Temperature 24.0 - 260 $^\circ\text{C}$	@Temperature 75.2 - 500 $^\circ\text{F}$	
	11.75 $\mu\text{m}/\text{m}\cdot^\circ\text{C}$	6.528 $\mu\text{in}/\text{in}\cdot^\circ\text{F}$	H900 Condition
	@Temperature 24.0 - 593 $^\circ\text{C}$	@Temperature 75.2 - 1100 $^\circ\text{F}$	
Specific Heat Capacity	0.477 J/g- $^\circ\text{C}$	0.114 BTU/lb- $^\circ\text{F}$	
Thermal Conductivity	15.0 W/m-K	104 BTU-in/hr-ft ² - $^\circ\text{F}$	condition H 900
	@Temperature 23.0 $^\circ\text{C}$	@Temperature 73.4 $^\circ\text{F}$	
	18.2 W/m-K	126 BTU-in/hr-ft ² - $^\circ\text{F}$	condition H 900
	@Temperature 200 $^\circ\text{C}$	@Temperature 392 $^\circ\text{F}$	
	24.4 W/m-K	169 BTU-in/hr-ft ² - $^\circ\text{F}$	condition H 900
	@Temperature 500 $^\circ\text{C}$	@Temperature 932 $^\circ\text{F}$	

Component Elements Properties	Metric	English	Comments
Carbon, C	<= 0.050 %	<= 0.050 %	min. Nb content = 8 x C content
Chromium, Cr	14 - 16 %	14 - 16 %	
Copper, Cu	1.25 - 1.75 %	1.25 - 1.75 %	
Iron, Fe	75 %	75 %	as remainder
Manganese, Mn	<= 1.0 %	<= 1.0 %	
Molybdenum, Mo	0.50 - 1.0 %	0.50 - 1.0 %	
Nickel, Ni	5.0 - 7.0 %	5.0 - 7.0 %	
Phosphorous, P	<= 0.030 %	<= 0.030 %	
Silicon, Si	<= 1.0 %	<= 1.0 %	
Sulfur, S	<= 0.030 %	<= 0.030 %	

Electrical Properties	Metric	English	Comments
Electrical Resistivity	0.0000846 ohm-cm	0.0000846 ohm-cm	H900 Condition

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