

Carpenter Custom 450® Stainless Steel, Annealed

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-Annealed.php

Physical Properties	Metric	English	Comments
Density	7.75 g/cc	0.280 lb/in ³	

Mechanical Properties	Metric	English	Comments
Hardness, Brinell	278	278	Estimated from Rockwell C for 3000 kg load, 10 mm ball Brinell measurement.
Hardness, Knoop	301	301	Estimated from Rockwell C
Hardness, Rockwell C	28	28	
Hardness, Vickers	292	292	Estimated from Rockwell C
Tensile Strength, Ultimate	979 MPa	142000 psi	
	1089 MPa	157900 psi	
	@Temperature -73.0 °C	@Temperature -99.4 °F	
	1427 MPa	207000 psi	
	@Temperature -196 °C	@Temperature -321 °F	
Tensile Strength, Yield	814 MPa	118000 psi	
	@Strain 0.200 %	@Strain 0.200 %	
	883 MPa	128000 psi	
	@Strain 0.200 %, Temperature -73.0 °C	@Strain 0.200 %, Temperature -99.4 °F	

Mechanical Properties	Metric	English	Comments
	2137 MPa	309900 psi	
	@Strain 0.200 %, Temperature -196 °C	@Strain 0.200 %, Temperature -321 °F	
Elongation at Break	13 %	13 %	In 4D
	15 %	15 %	In 4D
	@Temperature -73.0 °C	@Temperature -99.4 °F	
	17 %	17 %	In 4D
	@Temperature -196 °C	@Temperature -321 °F	
Reduction of Area	50 %	50 %	
	47 %	47 %	
	@Temperature -196 °C	@Temperature -321 °F	
Modulus of Elasticity	200 GPa	29000 ksi	
Notched Tensile Strength	1524 MPa	221000 psi	$K_{sub}t_{sub} = 10$
	@Temperature 23.0 °C	@Temperature 73.4 °F	
	1731 MPa	251100 psi	$K_{sub}t_{sub} = 10$
	@Temperature -73.0 °C	@Temperature -99.4 °F	
	2137 MPa	309900 psi	$K_{sub}t_{sub} = 10$
	@Temperature -196 °C	@Temperature -321 °F	
Poissons Ratio	0.29	0.29	
Fatigue Strength	517 MPa	75000 psi	R.R. Moore Test, Smooth Rotating Beam
	@# of Cycles 1.00e+7	@# of Cycles 1.00e+7	
Shear Modulus	77.5 GPa	11200 ksi	Calculated
Charpy Impact	133 J	98.1 ft-lb	V-notch
	41.0 J	30.2 ft-lb	V-notch
	@Temperature -196 °C	@Temperature -321 °F	
	92.0 J	67.9 ft-lb	V-notch
	@Temperature -73.0 °C	@Temperature -99.4 °F	

Thermal Properties	Metric	English	Comments
CTE, linear	10.44 $\mu\text{m}/\text{m}\cdot\text{°C}$	5.800 $\mu\text{in}/\text{in}\cdot\text{°F}$	
	@Temperature 24.0 -	@Temperature 75.2 -	

Thermal Properties	260 °C Metric	500 °F English	Comments
	10.58 µm/m-°C	5.878 µin/in-°F	
	@Temperature 24.0 - 93.0 °C	@Temperature 75.2 - 199 °F	
	11.11 µm/m-°C	6.172 µin/in-°F	
	@Temperature 24.0 - 593 °C	@Temperature 75.2 - 1100 °F	
Specific Heat Capacity	0.477 J/g-°C	0.114 BTU/lb-°F	
Thermal Conductivity	15.0 W/m-K	104 BTU-in/hr-ft ² -°F	condition H 900
	@Temperature 23.0 °C	@Temperature 73.4 °F	
	18.2 W/m-K	126 BTU-in/hr-ft ² -°F	condition H 900
	@Temperature 200 °C	@Temperature 392 °F	
	24.4 W/m-K	169 BTU-in/hr-ft ² -°F	condition H 900
	@Temperature 500 °C	@Temperature 932 °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	0.0000992 ohm-cm	0.0000992 ohm-cm	

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