Technical Datasheet

CarTech® 430F Stainless

Identification

UNS Number

• S43020

Type Analysis

Single figures are nominal except where noted.

Carbon (Maximum)	0.12 %	**Manganese (Maximum)**	1.25 %
Phosphorus (Maximum)	0.060 %	**Sulfur (Minimum)**	0.150 %
Silicon (Maximum)	1.00 %	**Chromium**	16.00 to 18.00 %
Molybdenum (Maximum)	0.60 %	**Iron**	Balance

General Information

Description

CarTech 430F stainless should be considered when making machined articles from a 17% chrome steel. Type 430F does not harden by heat treatment. It has been used in automatic screw machines for parts requiring good corrosion resistance such as aircraft parts, gears, etc. CarTech 430F is not recommended for vessels containing gases or liquids under high pressure.

Scaling

The safe scaling temperature for continuous service is 1500ºF (816ºC). The low coefficient of expansion of Carpenter Stainless Type 430F makes it useful for moderately high temperature applications.

Corrosion Resistance

Carpenter Stainless Type 430F resists corrosion from the atmosphere, fresh water and steam, foodstuffs, dairy products, nitric acid and may petroleum products and organic materials. Its resistance to chloride-stress-corrosion crackling at elevated temperatures is superior to that of austenitic Types 304 and 316.

For optimum corrosion resistance, surfaces must be free of scale, lubricants, foreign particles, and coatings applied for drawing and heading. After fabrication of parts, cleaning and/or passivation should be considered.

Important Note: *The following 4-level rating scale is intended for comparative purposes only. Corrosion testing is recommended; factors which affect corrosion resistance include temperature, concentration, pH, impurities, aeration, velocity, crevices, deposits, metallurgical condition, stress, surface finish and dissimilar metal contact.*

Nitric Acid	Good	Sulfuric Acid	Restricted
Phosphoric Acid	Restricted	Acetic Acid	Restricted
Sodium Hydroxide	Moderate	Salt Spray (NaCl)	Moderate
Sea Water	Restricted	Humidity	Excellent

Properties

Physical Properties

Specific Gravity	7.70	
Density	0.2780	lb/in³
Mean Specific Heat (32 to 212°F)	0.1100	Btu/lb/°F
Mean CTE (32 to 1200°F)	6.60	x 10^{-6} in/in/°F
Modulus of Elasticity (E)	29.0	x 10^{3} ksi
Electrical Resistivity (70°F)	361.0	ohm-cir-mil/ft

Typical Mechanical Properties

Typical Room Temperature Mechanical Properties—Carpenter Stainless Type 430F
1" (25.4mm) round bar, cold-drawn finish.

0.2% Yield Strength		Ultimate Tensile Strength		% Elongation in 2" (50.8 mm)	% Reduction of Area	Brinell Hardness
ksi	MPa	ksi	MPa			
65	448	90	621	15	55	190

Heat Treatment

Annealing

Heat uniformly to 1250/1400ºF (677/760ºC)---cool in air. Brinell hardness approximately 170.

Hardening

Does not respond to hardening by heat treatment---hardness moderately increased by cold working.

Workability

Forging

Carpenter Stainless Type 430F should be heated uniformly to 1500/1600ºF (816/871ºC) and then taken to the forging temperature of 1950/2100ºF (1066/1149ºC) as rapidly as possible. Do not soak at the forging temperature since this produces grain growth. Hot-working operations should not be continued when the temperature has dropped below 1500ºF (816ºC). Forgings should be air cooled and then annealed.

Cold Working

Carpenter Stainless Type 430F will withstand moderate cold work, but is not recommended for cold upsetting. The primary application for this steel is in parts that are machined to shape.

Machinability

Carpenter Stainless Type 430F cuts very freely and in automatic screw machines it machines like SAE 1030, 1120 or X1340.

Following are typical feeds and speeds for Carpenter Stainless Type 430F.

Typical Machining Speeds and Feeds—Carpenter Stainless Type 430F
The speeds and feeds in the following charts are conservative recommendations for initial setup. Higher speeds and feeds may be attainable depending on machining environment.

Turning—Single-Point and Box Tools

Depth of Cut (inches)	Micro-Melt® Powder High Speed Tools			Carbide Tools (inserts)			
	Tool Material	Speed (fpm)	Feed (ipr)	Tool Material	Speed (fpm) Uncoated	Speed (fpm) Coated	Feed (ipr)
.150	M48, T15	198	.015	C6	600	735	.015
.025	M48, T15	222	.007	C7	675	835	.007

Turning—Cut-Off and Form Tools

Tool Material		Speed (fpm)	Feed (ipr)					
Micro-Melt® Powder High Speed Tools	Carbide Tools		Cut-Off and Form Tools Width (inches)					
			1/16	1/8	1/4	1/2	1	1 1/2	2
M48, T15		180	.0015	.002	.0025	.0025	.002	.0015	.001
	C6	480	.004	.0055	.007	.005	.004	.0035	.0035

Rough Reaming

Micro-Melt® Powder High Speed Tools		Carbide Tools		Feed (ipr) Reamer Diameter (inches)					
Tool Material	Speed (fpm)	Tool Material	Speed (fpm)	1/8	1/4	1/2	1	1 1/2	2
M48, T15	156	C2	150	.005	.008	.013	.018	.022	.025

Drilling*

High Speed Tools									
Tool Material	Speed (fpm)	Feed (inches per revolution) Nominal Hole Diameter (inches)							
		1/16	1/8	1/4	1/2	3/4	1	1 1/2	2
M42	100	.001	.003	.006	.010	.014	.017	.021	.025
C6 uncoated	150-200	.002	.004	.008	.012	.018	—	—	—
C6 coated	200-250	.002	.004	.008	.012	.018	—	—	—

*Note - Drill should be 130-140 degree included angle and use a split point.

Die Threading

FPM for High Speed Tools				
Tool Material	7 or less, tpi	8 to 15, tpi	16 to 24, tpi	25 and up, tpi
M1, M2, M7, M10	15-25	30-40	40-50	50-60

End Milling—Peripheral

Depth of Cut (inches)	Micro-Melt® Powder High Speed Tools						Carbide Tools					
	Tool Material	Speed (fpm)	Feed (ipt) Cutter Diameter (inches)				Tool Material	Speed (fpm)	Feed (ipt) Cutter Diameter (inches)			
			1/4	1/2	3/4	1-2			1/4	1/2	3/4	1-2
.050	M48, T15	168	.001	.002	.004	.005	C6	400	.001	.002	.005	.007

Tapping

High Speed Tools	
Tool Material	Speed (fpm)
M1, M7, M10	20-45

Broaching

Micro-Melt® Powder High Speed Tools		
Tool Material	Speed (fpm)	Chip Load (ipt)
M48, T15	36	.0040

Figures used for all metal removal operations covered are typical. On certain work, the nature of the part may require adjustment of speeds and feeds. Each job has to be developed for best production results with optimum tool life. Speeds or feeds should be increased or decreased in small steps.

Additional Machinability Notes

When using carbide tools, surface speed feet/minute (SFPM) can be increased between 2 and 3 times over the high speed suggestions. Feeds can be increased between 50 and 100%.

Figures used for all metal removal operations covered are average. On certain work, the nature of the part may require adjustment of speeds and feeds. Each job has to be developed for best production results with optimum tool life. Speeds or feeds should be increased or decreased in small steps.

Weldability

Carpenter Stainless 430F is not usually recommended for welding. The high sulfur content may cause hot cracking, and when welding to a stainless steel with a lower sulfur content, may cause the weld to shift off center. If the alloy must be welded, the use of a filler metal, along with minimum heat inputs and minimum base metal dilution, will improve the chances of success.

AWS E/ER430 welding consumables should be considered; however, the weldments should be postweld annealed to restore the ductility in the weld metal and heat-affected zones. The use of austenitic weld metals, like E/ER309, should provide welds of good ductility. However, in this case, the heat-affected zone may have limited ductility unless the weldment is given a postweld anneal.

Other Information

Applicable Specifications

- ASTM A314
- ASTM A473
- ASTM A581
- ASTM A582
- ASTM A838

Forms Manufactured

- Bar-Rounds
- Billet
- Wire
- Wire-Rod

Technical Articles

- A Guide to Etching Specialty Alloys for Microstructural Evaluation
- How to Passivate Stainless Steel Parts
- New Ideas for Machining Austenitic Stainless Steels
- Passivating and Electropolishing Stainless Steel Parts

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