Technical Datasheet

CarTech® 430 Stainless

Identification

UNS Number

• S43000

Type Analysis

Single figures are nominal except where noted.

Carbon (Maximum)	0.12 %	**Manganese (Maximum)**	1.00 %
Phosphorus (Maximum)	0.040 %	**Sulfur (Maximum)**	0.030 %
Silicon (Maximum)	1.00 %	**Chromium**	16.00 to 18.00 %
Iron	Balance		

General Information

Description

CarTech 430 stainless is a corrosion- and heat-resisting 17% chromium ferritic stainless steel which has been used for all types of decorative trim.

Applications

Many pieces of bright trim on automobiles have been made of CarTech 430 stainless, such as body molding, door handles, hub caps, instrument panel trim, finishing washers, bumper medallions, and gas tank caps. The color, when buffed, is very close to that of chromium plate. It also has been used for trim on cameras, vending machines, counters and showcases, electrical appliances and a host of other things that need "dressing up" to increase their marketability. It is equally applicable to finished hardware and moldings used in the building trades.

Selection

There are several other alloys or modifications with improved corrosion resistance and oxidation resistance, all with basic mechanical characteristics of Type 430.

GRADE CHARACTERISTIC
430F free-machining version
434 offers improved resistance to chloride pitting
443 higher chromium alloy with improved corrosion resistance
446 resists oxidation up to 1900°F
Project 70® 182-FM free-machining alloy with corrosion resistance similar to that of Type 303

Scaling

The safe scaling temperature for continuous service is 1500ºF (816ºC).

Corrosion Resistance

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

The alloy has acceptable resistance to sulfide cracking at Rockwell C 22 maximum hardness per NACE MR-01-75, "Sulfide Stress Cracking Resistant Metallic Materials for Oil Field Equipment." Refer to the current documents for details on acceptable conditions.

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	Sour Oil/Gas	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
Thermal Conductivity (212°F)	181.0	BTU-in/hr/ft²/°F
Modulus of Elasticity (E)	29.0	x 10^{3} ksi
Electrical Resistivity (70°F)	361.0	ohm-cir-mil/ft

Typical Mechanical Properties

Strip:

The following hyperlink displays mechanical properties of Carpenter Stainless Type 430 cold-rolled strip when annealed dead soft with a bright smooth surface.

Typical Room Temperature Mechanical Properties
1" (25.4 mm) round bar, annealed

0.2% Yield Strength		Ultimate Tensile Strength		% Elongation in 2" (50.8 mm)	% Reduction of Area	Brinell Hardness
ksi	MPa	ksi	MPa			
45	310	75	517	30	65	155

Heat Treatment

Annealing

Heat uniformly to 1400/1500ºF (760/816ºC). Remove charge from the furnace and cool in air. Brinell hardness approximately 155. When stampings and deep-drawn parts must be annealed in process, use same treatment as for full annealing. The annealing scale should be removed after each treatment. This can be done by pickling in 50% hydrochloric acid heated to 140/150ºF (60/65ºC). Wash and passivate.

Hardening

Carpenter Stainless Type 430 is not hardenable by heat treatment. However, its hardness can be moderately increased by cold work. Hardness up to about Rockwell C 25 can be obtained in sections of about ½" (12.7 mm) or under.

Workability

Hot Working

Carpenter Stainless Type 430 can be forged, upset and hot headed satisfactorily. In riveting, cone heads are best but do not heat above 1450ºF (788ºC), nor hold at heat more than about 20 minutes.

Forging

Heat uniformly to 1500/1600ºF (816/871ºC) and then increase as rapidly as possible to the forging temperature of 1900/2050ºF (1038/1121ºC). 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 430 can be readily blanked, formed, tempered, stamped, and cold-headed.

Machinability

In turning Operations, Carpenter Stainless Type 430 machines somewhat like SAE 3140 and 4140.

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

Turning—Single-Point and Box Tools

Depth of Cut (Inches)	High Speed Tools			Carbide Tools (Inserts)			
	Tool Material	Speed (fpm)	Feed (ipr)	Tool Material	Speed (fpm) Uncoated	Speed (fpm) Coated	Feed (ipr)
.150	M2	100	.015	C6	450	600	.015
.025	M3	125	.007	C7	550	750	.007

Turning—Cut-Off and Form Tools

Tool Material		Speed (fpm)	Feed (ipr)					
			Cut-Off Tool Width (inches)			Form Tool Width (inches)		
High Speed Tools	Carbide Tools		1/16	1/8	1/4	1/2	1	1 ½	2
M2		90	.001	.001	.0015	.0015	.001	.001	.001
	C6	325	.004	.0055	.007	.005	.004	.0035	.0035

Rough Reaming

High Speed		Carbide Tools		Feed (ipr) Reamer Diameter (inches)					
Tool Material	Speed (fpm)	Tool Material	Speed (fpm)	1/8	1/4	1/2	1	1 ½	2
M7	85	C2	105	.003	.005	.008	.012	.015	.018

Drilling

Tool Material	Speed (fpm)	High Speed Tools: Feed (inches per revolution) Nominal Hole Diameter (inches)							
		1/16	1/8	1/4	1/2	3/4	1	1 ½	2
M1, M10	60-70	.001	.002	.004	.007	.010	.012	.015	.018

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	15-20	20-30	35-45	40-50

Milling, End-Peripheral

Depth of Cut (inches)	High Speed Tools						Carbide Tools					
	Tool Material	Speed (fpm)	Feed (ipt) Cutter Diameter (in) 1/4	1/2	3/4	1-2	Tool Material	Speed (fpm)	Feed (ipt) Cutter Diameter (in) 1/4	1/2	3/4	1-2
.050	M2, M7	110	.001	.002	.003	.004	C6	350	.001	.002	.004	.006

Tapping

High Speed Tools	
Tool Material	Speed (fpm)
M1, M7, M10	15-40

Broaching

High Speed Tools		
Tool Material	Speed (fpm)	Chip Load (ipt)
M2, M7	20	.003

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 Type 430 has been satisfactorily welded by the shielded fusion and resistance welding processes. Oxyacetylene welding is not recommended, since carbon pickup in the weld may occur. When a filler metal is required consider AWS E/ER430; 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, has provided 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

- AMS 5627
- ASME SA182
- ASTM A182
- ASTM A240
- ASTM A276
- ASTM A314
- ASTM A473
- ASTM A479
- ASTM A493
- ASTM A580
- QQ-S-763
- SA 240
- SA 479

Forms Manufactured

- Bar-Rounds
- Billet
- Strip
- Wire
- Wire-Rod
- Wire-Shapes

Technical Articles

- A Designer's Manual On Specialty Alloys For Critical Automotive Components
- Alloy Selection for Cold Forming (Part I)
- Alloy Selection for Cold Forming (Part II)
- Development of Type 204 Cu Stainless, A Low-cost Alternative to Type 304
- How to Passivate Stainless Steel Parts
- How to Select the Right Stainless Steel or High Temperature Alloy for Heading
- New Engineering University Research Study Simplifies Selection of Coatings for Cold Heading
- New Ideas for Machining Austenitic Stainless Steels
- New Stainless for Fasteners Combines Corrosion Resistance, High Hardness and Cold Formability
- Passivating and Electropolishing Stainless Steel Parts
- Selecting New Stainless Steels for Unique Applications
- Selecting Stainless Steels for Valves
- Selection of High Strength Stainless Steels for Aerospace, Military and Other Critical Applications
- Stainless Steel Rebar For Concrete Reinforcement: An Update And Selection Guide

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