CARPENTER ELECTRIFICATION®

DATASHEET

430 STAINLESS

Applicable specifications: AMS 5627; ASME SA182; ASTM A182, A240, A276, A314, A473, A479, A493, and A580; QQ-S-763; SA 240 and 479

Associated specifications: UNS S43000

Type analysis

Single figures are nominal except where noted.

Iron	Balance	**Chromium**	16.00–18.00 %	**Manganese**	Max 1.00 %
Silicon	Max 1.00 %	**Carbon**	Max 0.12 %	**Phosphorus**	Max 0.040 %
Sulfur	Max 0.030 %				

Forms manufactured

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

Description

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

Many pieces of bright trim on automobiles have been made of 430, 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. 430 has also 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.

Key Properties:

- Corrosion resistance
- Heat resistance

Markets:

- Automotive
- Consumer
- Industrial

Applications:

- Automotive trim
- Appliance and other consumer-facing and industrial trim
- Finished hardware and moldings

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Alloy selection

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

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

Corrosion resistance

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 304 and 316.

430 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 that 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		

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Physical properties

PROPERTY	At or From	English Units
SPECIFIC GRAVITY	—	7.70
DENSITY	—	0.2780 lb/in^3
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/ft^2/°F
ELASTIC MODULUS	—	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 430 cold-rolled strip when annealed dead soft with a bright, smooth surface.

ROOM TEMPERATURE, 1 IN (24.4 MM) ROUND BAR, ANNEALED									
0.2% YIELD STRENGTH		ULTIMATE TENSILE STRENGTH		ELONGATION IN 2 IN (50.8 MM)		REDUCTION OF AREA		BRINELL HARDNESS	
ksi	MPa	ksi	MPa	%		%		HRB	
45	310	75	517	30		65		155	

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Heat treatment

Annealing	Heat uniformly to 1400/1500°F (760/816°C). 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 140/150°F (60/65°C). Wash and passivate.
Hardening	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 0.5 in (12.7 mm) or under.

Workability

Hot working	430 can be forged, upset and hot headed satisfactorily. In riveting, cone heads are best, but do not heat above 1450°F (788°C), nor hold at heat more than about 20 minutes.
Forging	Heat uniformly to 1500/1600°F (816/871°C) and then increase as rapidly as possible to the forging temperature of 1900/2050°F (1038/1121°C). 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 1500°F (816°C). Forgings should be air-cooled and then annealed.
Cold working	430 can be readily blanked, formed, tempered, stamped, and cold-headed.
Machinability	In turning operations, 430 machines somewhat like SAE 3140 and 4140.
Weldability	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.

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Scaling	The safe scaling temperature for continuous service is 1500°F (816°C).
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.

Typical feeds and speeds

The speeds and feeds in the following charts are conservative recommendations for initial setup. Higher speeds and feeds may be attainableness depending on machining environment. See the additional machinability notes above.

TURNING — SINGLE-POINT AND BOX TOOLS

DEPTH OF CUT, IN	HIGH-SPEED TOOLS			CARBIDE TOOLS (INSERTS)			
	SPEED, FPM	FEED, IPR	TOOL MATERIAL	SPEED, FPM		FEED, IPR	TOOL MATERIAL
				UNCOATED	COATED		
.150	100	.015	M-2	450	600	.015	C-6
.025	125	.007	M-3	550	750	.007	C-7

TURNING — CUT-OFF AND FORM TOOLS

SPEED, FPM	FEED, IPR							TOOL MATERIAL	
	CUT-OFF TOOL WIDTH, IN			FORM TOOL WIDTH, IN				HIGH-SPEED TOOLS	CARBIDE TOOLS
	1/16	*1/8*	*1/4*	*1/2*	*1*	*1-1/2*	*2*		
90	.001	.001	.0015	.0015	.001	.001	.001	M-2	—
325	.004	.0055	.007	.005	.004	.0035	.0035	—	C-6

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ROUGH REAMING

HIGH-SPEED TOOLS		CARBIDE TOOLS		FEED, IPR, REAMER DIAMETER, IN					
SPEED, FPM	TOOL MATERIAL	SPEED, FPM	TOOL MATERIAL	1/8	1/4	1/2	1	1-1/2	2
85	M-7	105	C-2	.003	.005	0.008	.012	.015	.018

DRILLING — HIGH-SPEED TOOLS

SPEED, FPM	FEED, IPR NOMINAL HOLE DIAMETER, IN								TOOL MATERIAL
	1/16	1/8	1/4	1/2	3/4	1	1-1/2	2	
60–70	.001	.002	.004	.007	.010	.012	.015	.018	M-1, M-10

DIE THREADING — HIGH-SPEED TOOLS

SPEED, FPM				TOOL MATERIAL
7 OR LESS, TPI	8 TO 15, TPI	16 TO 24, TPI	25 AND UP, TPI	
15–20	20–30	35–45	40–50	M-1, M-2, M-7, M-10

MILLING — END PERIPHERAL

DEPTH OF CUT, IN	HIGH-SPEED TOOLS						CARBIDE TOOLS					
	SPEED, FPM	FEED, IN PER TOOTH CUTTER DIAMETER, IN				TOOL MATERIAL	SPEED, FPM	FEED, IPT CUTTER DIAMETER, IN PER TOOTH				TOOL MATERIAL
		1/4	1/2	3/4	1-2			1/4	1/2	3/4	1-2	
.050	110	.001	.002	.003	.004	M-2, M-7	350	.001	.002	.004	.006	C-6

TAPPING — HIGH-SPEED TOOLS

SPEED, FPM	TOOL MATERIAL
15–40	M-1, M-7, M-10

BROACHING — HIGH-SPEED TOOLS

SPEED, FPM	CHIP LOAD, IN PER TOOTH	TOOL MATERIAL
20	.003	M-2, M-7

For additional information, please contact your nearest sales office:
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