Crucible Data Sheet

Issue #7

CRUCIBLE 430 STAINLESS STEEL

Carbon	**0.12% max.**
Silicon	**1.00% max**
Sulfur	**0.03% max.**
Manganese	**1.00% max.**
Phosphorus	**0.04% max.**
Chromium	**14.00/18.00%**

CRUCIBLE 430 is essentially a non-hardenable chromium steel which is adaptable for general purpose corrosion and heat resisting applications. It is prone to slight hardening by heat treatment. This grade is magnetic at all times.

For those applications where superior machinability is desired, and where slightly lowered corrosion resistance is satisfactory, CRUCIBLE 430F can be supplied.

Typical Applications:

Appliance parts
Bathroom fixtures
Oil burner rings
Cold headed fasteners
Nitrogen fixation equipment
Window anchor bolts

Note: The above are some *typical* applications. Your *specific* application should not be undertaken without independent study and evaluation for suitability.

Forging:

CRUCIBLE 430 should be forged at 1900 to 1950 F and finished between 1300 and 1500 F. Reheating should be used if necessary. The last reheating should not be higher than 1900 F to prevent undue grain growth.

Annealing:

CRUCIBLE 430 should be annealed for maximum softness and corrosion resistance at 1450 to 1550 F followed by air cooling or water quenching. This grade may be semi-annealed for machining at 1250 F followed by an air cool.

Hardening:

CRUCIBLE 430 can be hardened slightly by cold working. The effect of cold working is shown in Figure 1.

Forming:

CRUCIBLE 430 can be formed to most desired shapes with very little difficulty. Preheating to 200 to 300 F facilitates the forming of intricate shapes.

Welding:

CRUCIBLE 430 can be welded with Type 430 filler weld metal. This grade should not be used in the welded condition for those applications subject to severe impact in service.

CRUCIBLE 430 should be pre-heated to 300 F minimum prior to welding, allowed to cool to below 250 F after welding and then post-heated at 1400 to 1500 F for at least one-half hour plus one hour per inch of thickness over one inch. This post-heating will temper the martensite which is formed in the weld area.

Type 308 or 309 filler weld metal should be used when preheating and post-heating are not feasible, due to the beneficial effects of nickel in reducing brittleness.

Resistance to Scaling:

CRUCIBLE 430 scales at approximately 1600 F. This temperature will vary with the

Note: Temperatures shown throughout this data sheet are metal temperatures.

type of atmosphere, type of construction and cycle of operation.

General Corrosion Resistance:

CRUCIBLE 430 possesses excellent resistance to corrosion, being surpassed only by the higher chromium and austenitic chromium and nickel grades. It is resistant to the corrosive action of the atmosphere, fresh water, a variety of milder acids and alkalies, and is particularly resistant to corrosive attack by nitric acid. Detailed results of CRUCIBLE 430 corrosion tests are given in the CRUCIBLE Corrosion Resistance Data Sheet.

Physical Properties:

Modulus of elasticity in tension — 1000 psi	29,000
Specific electrical resistance	
Room temperature — microhms/cm	59.94
Specific heat — Btu./lb./°F (32-212°F)	0.11
Specific gravity	7.72
Weight — lb./cu. in.	.278
Thermal conductivity — Btu./hr./sq. ft./°F/ft.	
At 200°F	13.1
1000°F	15.2
Mean coefficient of thermal expansion — in/in/°F x 10^{-6} (See Fig. 1)	
32- 212°F	5.8
32- 600°F	6.1
32-1000°F	6.3
32-1200°F	6.6
32-1500°F	6.9
Melting point range — °F	2600/2750

Mechanical Properties: (All values are representative properties in the annealed condition):

Room Temperature:	**BAR-1 in. Rd.**
Tensile strength, 1000 psi	75
Yield strength (0.2% Offset), 1000 psi	40
Elongation in 2 in., %	30
Reduction of area, %	60
Izod impact resistance, ft. lbs.	40
Hardness	160 BHN
Endurance limit (fatigue), 1000 psi	40
Cold bend, deg.	180

Specifications

CRUCIBLE 430 meets the following specifications:

QQ-S-763d	AMS 5627A	ASTM A276-67	ASTM A580-67

Machining data

Operation	Tool Width or (in) Depth of Cut	CRUCIBLE 430 High Speed Tooling		Carbide Tooling	
		Speed (fpm)	Feed (in/rev)	Speed (fpm)	Feed (in/rev)
Turning single point	0.050	95	0.0050	275	0.010
	0.250	85	0.0035	200	0.020
	0.500	80	0.0030	175	0.030
Forming	1/2 wide	95	0.0015	200	0.003
	1 wide	90	0.0010	175	0.002
	1½ wide	90	0.0010	175	0.002
	2 wide	90	0.0008	175	0.002
Cutoff	1/16 wide	90	0.0010	175	0.002
	1/8 wide	95	0.0015	175	0.003
	3/16 wide	100	0.0015	200	0.003
	1/4 wide	100	0.0020	200	0.003
Drilling	1/16 dia.	60	0.0015		
	1/8 dia.	60	0.0020		
	1/4 dia.	60	0.0030		
	1/2 dia.	60	0.0035		
	3/4 dia.	65	0.0040		
	1 dia.	65	0.0045		
Threading†			—		
Tapping†			—		

†Use the higher speeds for the finer threads.

Elevated Temperature

Short Time Elevated Temperature Tensile Strength:

Temperature °F	Tensile strength 1000 psi
1000	39
1100	29
1200	21
1300	14
1500	7
1700	4

Creep Data:

Temperature °F	Tensile strength 1000 psi Stress for creep rate
1000	8.5
1100	4.3
1200	2.2
1300	1.3

Stress Rupture Data:

Test temperature °F	Stress (1000 psi) for rupture in 1,000 hrs.	10,000 hrs.
900	30.0	24.0
1000	17.5	13.5
1100	9.1	6.5
1200	5.0	3.4

Representative Mechanical Properties as Cold Worked:

Size—$^{3}/_{8}$" rd.—unstraightened.
Original condition—annea ed.

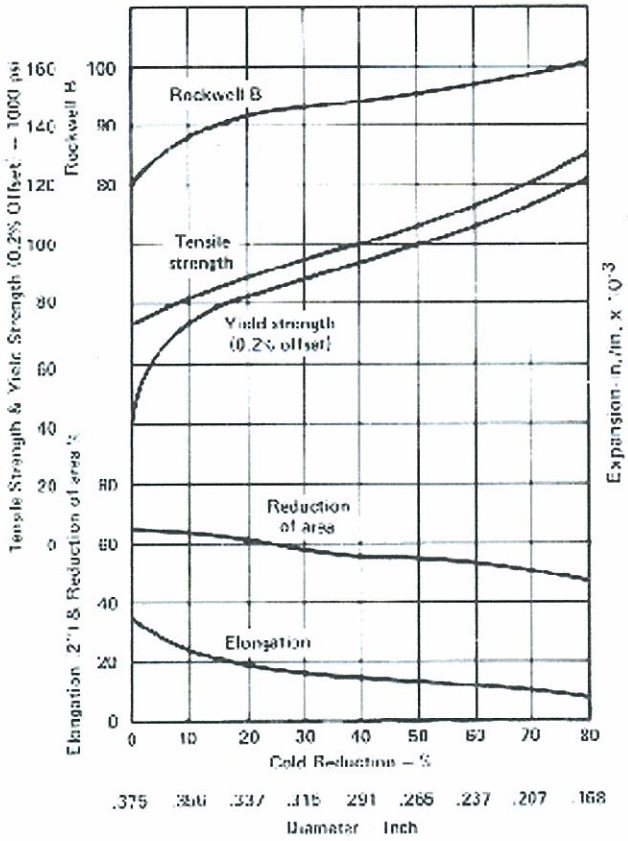

Figure 1

Thermal Expansion:

Annealed—1450°F, Water Quench.

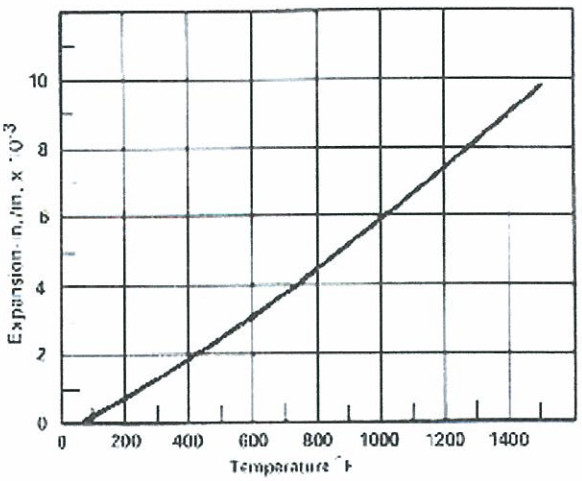

Figure 2

Note: Properties shown throughout this data sheet are typical values. Normal variations in chemistry, size, and conditions of heat treatment may cause deviations from these values.

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