

# Crucible Data Sheet

Issue #2

Crucible 430F is a low carbon, high chromium ferritic stainless steel, specially developed for solenoid core applications in corrosive environments\*. The chemistry is closely controlled to develop optimum machining and magnetic properties.

## Heat Treatment

Annealing for optimum magnetic properties may be done by heating between 1450° and 1550°F, holding for 1/2 hour per inch of thickness, then furnace cooling at 50°F per hour to 1100°F, and finally air cooling.

## Forging

Crucible 430F can be forged between 1950-2150°F however, severe deformations are not recommended. Heat uniformly to 1400°F range, then increase to the forging temperature quickly. Do not oversoak and do not work under 1500°F.

## Welding

Not recommended for fusion welding due to the presence of high sulfur.

\*Note: Specific applications should not be undertaken without independent study and evaluation for suitability.

## Crucible 430F Solenoid Quality Stainless Steel

Carbon	0.06%
Manganese	0.40%
Phosphorus	.025%
Sulfur	0.30%
Silicon	0.50%
Chromium	17.50%



## Corrosion Resistance

Generally comparable with Type 430, with excellent resistance to fresh water, air and a variety of milder acids and alkalis. For maximum protection, surfaces should be free of foreign particles and all finished machined parts should be passivated.

## Typical Magnetic Properties as Supplied

DC Max Permeability	800
Bsat (K Gausses)	14.5
Br (K Gausses from 10K Gausses)	6.5
Hc (Oersteds from 10K Gausses)	4.0

## Physical Constants:

Density, lb/cu in.	0.276
Specific gravity	7.65
Melting point, °F	2714
Thermal coef. expansion/°F	
68 to 212°F	5.7 x 10 <sup>-6</sup>
68 to 932°F	6.2 x 10 <sup>-6</sup>
68 to 1450°F	6.6 x 10 <sup>-6</sup>
Thermal conductivity, Btu/sq ft/hr/°F/ft.	13.7
Electrical resistivity	See Table 1
Modulus of elasticity, psi (tension)	29 x 10 <sup>6</sup>

## Properties

**Table 1—Electrical Resistivity**

Test Temperature °F	Resistivity microhm-cm
68	23.5
212	26.6
392	30.3
752	36.4
1112	41.3
1472	45.3

**Table 2—Typical Mechanical Properties of Annealed Bars**

Tensile strength, psi	80,000
Yield strength (0.2% offset), psi	50,000
Elongation (2 in.), %	30.0
Reduction of area, %	60.0
Fatigue strength, psi (approximate)	30,000
Hardness (Rockwell B)	88

**Table 3—Short-Time Elevated-Temperature Tensile Properties of Annealed Bars**

Test Temperature °F	Tensile Strength psi	Elongation (2 in.) %	Reduction of Area %
70	77000	32	74
200	72000	30	74
400	67000	27	76
600	64000	26	75
800	56000	29	75
1000	36000	35	64
1200	19000	61	97
1400	7000	70	99

**Table 4—Typical Machining Data**

Operation and Size of Cut	High Speed		Carbide	
	Speed sfpm	Feed ipr	Speed sfpm	Feed ipr
Single-point turning—1-in. depth	160	0.015	350	0.015
Forming—1-in. width	150	0.0015	260	0.0045
Drilling—3/4-in. dia.	120	0.0055	—	—
Reaming—3/4-in. dia.	110	0.0065	300	0.015
End milling—3/4-in. dia by 1/16-in. width	130	0.016	325	0.020

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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