

# Crucible Data Sheet

CRUCIBLE 20 Cb Plus is a non-hardenable austenitic stabilized stainless steel with exceptional resistance to sulfuric, phosphoric, and nitric acid. The grade also has good resistance to stress-corrosion cracking.

## Typical Applications

Pickling Equipment  
Heat Exchangers  
Flue Gas Scrubbing Systems  
Chemical & Petroleum Process Equipment  
Pumps  
Valve  
Bolts  
Nuts  
Fittings

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

## Corrosion Resistance

The average corrosion resistance of annealed Crucible 20 Cb Plus in various concentrations and temperatures of sulfuric acid is shown in the following table. (The normal contaminants in commercial sulfuric acid will result in lower corrosion rates.)

## Typical Corrosion Rate-Inches per year in Sulfuric Acid.

	221F (105C)	230F (110C)	248F (120C)	260F (130C)
5% Acid	.016	.022	.030	.031
10% Acid	.025	.032	.048	.048
25% Acid	.027	.050	.060	.060

## Stress Corrosion Resistance

Crucible 20 Cb Plus has good resistance to stress, corrosion cracking in both sulfuric acid and boiling magnesium chloride.

## CRUCIBLE 20 Cb PLUS STAINLESS STEEL

Issue #1

Carbon	0.06 max.
Manganese	2.00 max.
Phosphorus	0.035 max.
Sulfur	0.035 max.
Silicon	1.00 max.
Nickel	32.50-35.00
Chromium	19.00-21.00
Molybdenum	2.0-3.00
Columbium & Tantalum	8 x Carbon Min. to 1.00 max.
Copper	3.0-4.00



## Specifications

ASTM B-472, ASTM B0473

## Forging

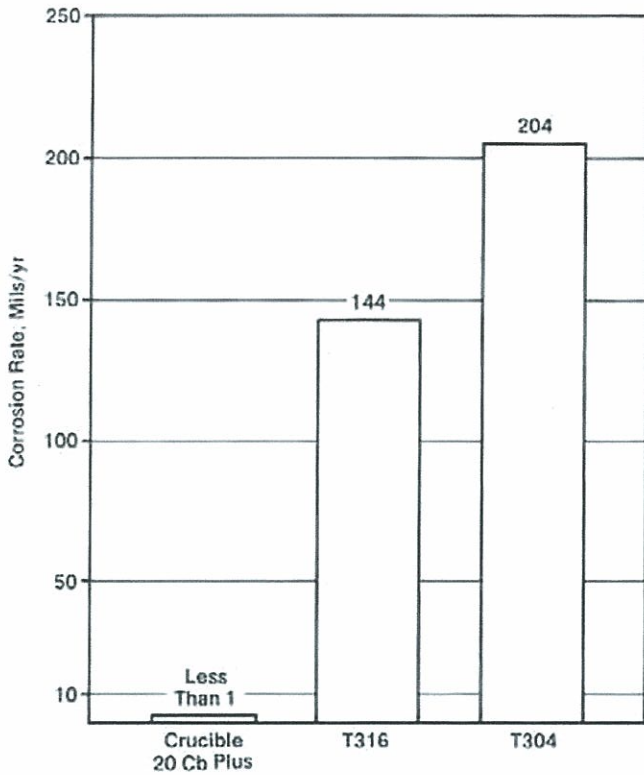
The recommended forging range for Crucible 20 Cb Plus is 2100-2250°F (1149-1233°C)

## Annealing

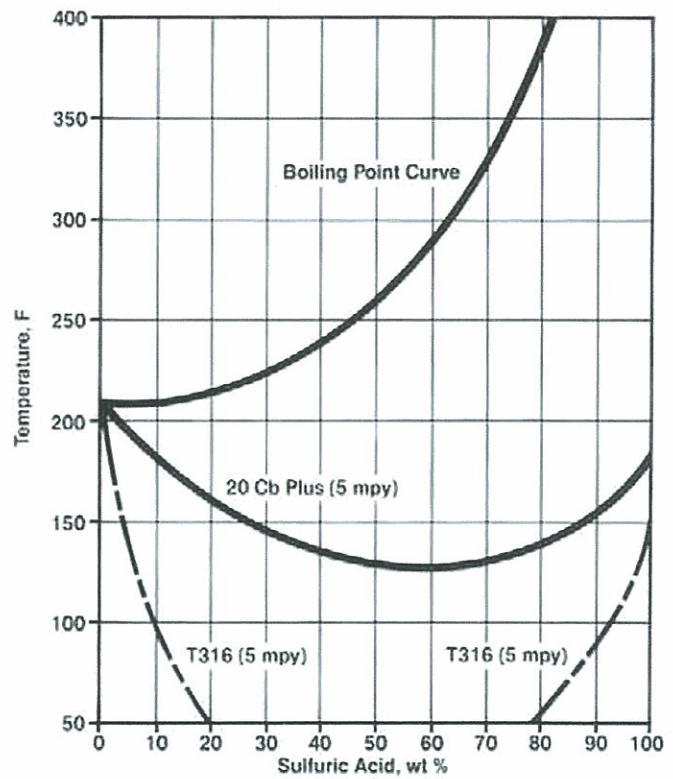
For optimum resistance to sensitization Crucible 20 Cb Plus should be annealed 1700-1750°F (929-955°C) for ½ hour per inch of thickness and water quench. For maximum cold formability and at some sacrifice of corrosion resistance after sensitization, Crucible 20 Cb Plus may be annealed at 2000-2100°F (1094-1149°C) followed by a water quench.

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

**Relative corrosion rates of Crucible 20 Cb Plus, Type 316, and Type 304 in 66% Sulfuric Acid at 90F**



**Corrosion Resistance of Crucible 20 Cb Plus Compared to T-316 in Sulfuric Acid**



**Physical Properties**

Density lb/cu in. ....	0.291
Specific heat Btu per lb. per °F (32.-212F) .....	0.12
Specific Electrical Resistance at room temp Ohms per Cu Mil. Ft .....	625
Coefficient of thermal expansion in/in °F x 10 <sup>-6</sup>	
77- 212F .....	8.31
77- 843F .....	9.43
77-1652F .....	9.97
Modulus of elasticity in tension-psi .....	28,000
Torsion Modulus in tension-psi .....	11,000

**Mechanical Properties**

(Bars 1" Rd. in the annealed 1750°F (955°C) condition)

Tensile (ksi) .....	95
.2% yld. (ksi) .....	45
Elong. in 2"% .....	40
Red. in Area % .....	65
Brinnell Hardness .....	179

### Cold Working

Crucible 20 Cb Plus can be readily cold formed by drawing, bending, upsetting, and stamping.

### Effect of Cold Work

% Cold Reduction	Ultimate Tensile		.2% Yield		Elongation in 2" (50.8mm)
	Ksi	MPa	Ksi	MPa	
0	95	655	45	310	40
20	119	820	110	758	12
30	133	917	124	854	6.5
50	155	1069	148	1020	4.6
80	175	1209	168	1158	2.3

### Short Time

#### Elevated Temperature Properties

Temperature		.2% Yld		Ultimate Tensile		% Elongation in 2"
F	C	Ksi	MPa	Ksi	MPa	
Room		45	310	95	—	45
400	204	35	241	83	572	44
800	427	30	207	79	545	40
1000	538	28	193	77	531	38
1400	760	26	179	45	310	52
1600	875	19	131	29	200	75

#### Low Temperature Tensile Properties

Temperature		.2% Yld Strength		Ultimate Tensile		% Elongation in 2"
F	C	Ksi	MPa	Ksi	MPa	
Room		55	381	95	658	33
-100	-73	63	437	109	753	36
-200	-129	71	491	120	826	36
-320	-196	78	598	154	1060	64

### Welding

Crucible 20 Cb Plus is weldable but since it is completely austenitic, special care must be taken to minimize the susceptibility to weld cracking. Crucible 20 Cb Plus when properly annealed, has good resistance to sensitization during welding and can be used in the as welded condition without further treatment.

### Machinability

Recommended Speeds (Surface Ft./Min) based on the use of high speed steels.

Turning	50-90
Drilling	30-60
Tapping	12-20
Threading	
Gen.	10-20
Fin.	5-10
Milling	35-70
Broaching	8-15
Reaming	20-60

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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