

# Crucible Data Sheet

Issue #1

CRUCIBLE 303 Se is a non-hardenable austenitic chromium-nickel steel to which selenium has been added to improve machinability and non-galling characteristics. This grade is non-magnetic in the annealed condition but may become slightly magnetic when cold worked. Typical applications are screw machine products which will be subjected to some cold forming.

## Typical Applications

- Screw machine products
- Swaged terminal hardware
- Machined shafts
- Finished guides
- Valves and accessories for chemical handling equipment

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

## Forging

CRUCIBLE 303 Se should be forged at 2100 to 2350°F (1150 to 1285°C) and finished above 1700°F (925°C). Reheating should be used if necessary.

CRUCIBLE 303 Se is not recommended for severe upsetting operations.

## Annealing

For maximum resistance to corrosion, CRUCIBLE 303 Se should be annealed at 1850 to 2050°F (1010 to 1120°C) followed by a water quench.

## Hardening

CRUCIBLE 303 Se in small or thin sections can be hardened by cold working. The effect of cold working is shown on page 3.

## CRUCIBLE 303 Se STAINLESS STEEL

Carbon	0.12% max.
Manganese	2.00% max.
Silicon	1.00% max.
Phosphorus	0.12/0.17%
Selenium	0.15/0.35%
Chromium	17.00/19.00%
Nickel	8.00/10.00%
Molybdenum	0.60% max.



## Forming

CRUCIBLE 303 Se will withstand more cold working than normal sulfur bearing 303 stainless steel.

## Welding

CRUCIBLE 303 Se is not generally recommended for welding as grades containing selenium may display porous welds.

## Resistance to scaling

CRUCIBLE 303 Se scales at approximately 1650°F (900°C). This temperature can vary with the type of atmosphere and application.

## General Corrosion Resistance

CRUCIBLE 303 Se resists rusting from most atmospheric sources and is suitable for use in a wide variety of applications such as solutions involving organic and inorganic chemicals. The general corrosion resistance is comparable to sulfur bearing 303 stainless steel.

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



## Passivation

It is recommended that finished parts machined from stainless steel be passivated for optimum corrosion resistance.

Free-machining types are prone to dulling and discoloration in passivating treatments. It

is important that correct procedures be followed when passivation is specified. The recommended treatment for CRUCIBLE 303 Se is shown below:

Acid concentration by volume of concentrated nitric acid	Sodium dichromate by weight	Bath temperature		Immersion time (min.)
		(°F)	(°C)	
20-40%	2.0%	110-140 (120 Typ.)	(45-60) (50)	15-30

## Machining

The machinability of CRUCIBLE 303 Se is achieved principally by the selenium addition, controlling other elements, and using the most modern manufacturing equipment available to produce bars of exceptional uniformity.

## Specifications

CRUCIBLE 303 Se has found wide industry acceptance and meets the following specifications:

**MIL-W-52263-C AMS 5640 ASTM A581 ASTM A582**

## Physical Properties

Modulus of elasticity in tension-psi. . . . .	28,000,000
Electrical resistivity	
Room temperature (microhm—centimeters). . . . .	72.1
Specific heat (Btu/lb./°F) 32-212°F. . . . .	0.12
Specific gravity. . . . .	7.92
Weight (lb./cu.in.). . . . .	0.286
Thermal conductivity (Btu/hr./sq.ft./°F/ft.)	
200°F. . . . .	9.4
1000°F. . . . .	12.5
Mean coefficient of thermal expansion (in/in/°F x 10 <sup>-6</sup> ) (See fig. 3)	
32- 212°F. . . . .	9.6
32- 600°F. . . . .	9.9
32-1000°F. . . . .	10.2
32-1200°F. . . . .	10.4
Melting point range. . . . .	2550/2590°F (1400/1420°C)

### Mechanical Properties

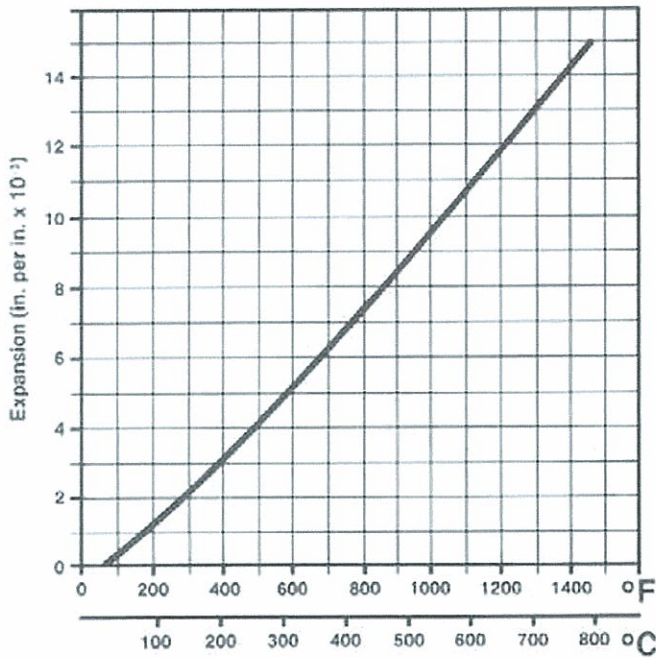
(All values are representative properties in the annealed condition)

#### Room Temperature

	Bar (1 in.rd.)
Tensile strength-psi.....	90,000
Yield strength (0.2% offset)-psi.....	35,000
Elongation in 2 in., (%).....	50
Reduction of area, (%).....	55
Izod Impact resistance, (ft.lbs).....	80
Hardness (BHN).....	170
Cold bend, (deg.).....	180

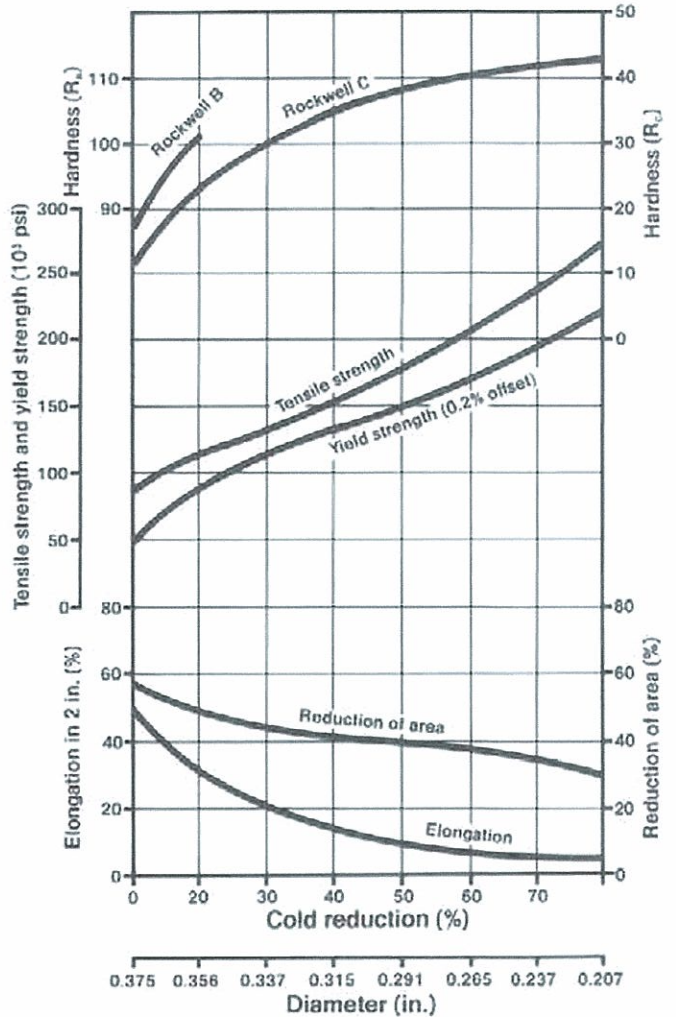
### Thermal Expansion

Annealed 2050°F, (1120°C) water quench



### Mechanical Properties as Cold Worked

Heat treatment: annealed, 1950°F (1063°C) water quenched Size: 3/8 in. rd., unstraightened and untempered.



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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