

## About 440c Stainless steel

### Overview:

440C Stainless steel is a type of modern steel and famous for its high corrosion resistant, wear resistance, strength and hardness qualities among all the stainless alloys, capable of attaining (after heat treatment) the highest hardness (60 HRC). It has good resistance to the atmosphere, fresh water and mild acids. It has best resistance in the hardened, tempered and passivated condition. It allows creating a smooth polished surface and Razor sharp edges. It is being used in cutting instruments, rolling element bearings, valve seats, high quality knife blades, surgical instruments, chisels, ball bearings and valve parts and most commonly used in the production of Cutting tools, including Haircutting Scissors, daggers and swords.

Grades 440A and 440B are identical except for slightly lower carbon contents (0.60 - 0.75% and 0.75 - 0.95% respectively), they attain lower hardness but slightly higher corrosion resistances. Although all three versions of this grade are standard grades, in practice 440C is more available than the A or B variants.

Another alloy 440F (UNS S44020) also exists, with the same high carbon content as 440C.

### Heat Resistance:

Not recommended for use in temperatures above the relevant tempering temperature, because of reduction in mechanical properties by over-tempering.

### Heat Treatment:

Annealing - Full anneal - 850-900C, slow furnace cool to about 600C and then air cool. Sub-critical Annealing - 735-785C and slow furnace cool.

Hardening - Heat to 1010-1065C, followed by quenching in warm oil or air. Oil quenching is necessary for heavy sections. Immediately temper at 150-370C to obtain a wide variety of hardness values and mechanical properties as indicated in the accompanying table.

Tempering in the range 425-565C is to be avoided because of reduced impact resistance and corrosion resistance. Tempering in the range 590-675C results in lower hardness (the product become machinable) and high impact resistance.

### Welding

If welding is necessary pre-heat at 250C and follow welding with a full anneal. Grade 420 filler will give a high hardness weld (not as high as the 440C). Generally welding of 440C is not recommended due to its hardening capability which can lead to the formation cracks within or near the weld.

### Machining

In the annealed condition this grade is relatively easily machined; approximately the same as for high speed steel. If this grade is hardened machining becomes very difficult and probably impossible.



**Composition**

Chemical Composition ranges of 440C stainless steel

<b>Grade440C</b>		
Ingredients	Min.	Max.
Carbon	0.95	1.20
Manganese	-	1.00
Silicon	-	1.00
Phosphorus	-	0.040
Sulphur	-	0.030
Chromium	16.00	18.00
Molybdenum	-	0.75
Iron	Balance	

**440C Physical Properties**

Grade	Density (kg/m <sup>3</sup> )	Elastic Modulus (GPa)	Mean Coefficient of Thermal Expansion (mm/m/C)			Thermal Conductivity (W/m.K)		Specific Heat 0-100C (J/kg.K)	Electrical Resistivity (nW.m)
			0- 100C	0- 200C	0- 600C	at 100C	at 500C		
440A/B/C	7650	200	10.1	10.3	11.7	24.2	-	460	600

**440C Related Specifications**

USA	Germany	Japan	Australia
ASTM A276-98b 440C SAE 51440C AISI 440C UNS S44004	W.Nr 1.4125 X105CrMo17	JIS G4303 SuS 440C	AS 2837-1986 440C

