

About 420 J2 Stainless steel

Overview:

420 J2 is a general purpose stainless steel containing medium quantity of carbon. It has good corrosion resistance qualities in mild atmosphere, domestic and industrial environments. It is resistant to ammonia, blood, carbonic acid, crude oil, detergent solutions, dilute nitric acid, fresh water, food acids, many petroleum products, steam and vinegar etc. It has good strength and reasonable impact resistant properties in both hardened and tempered conditions as compared to 440 grades.

It is also called Surgical Steel, because it is being used in production of surgical instruments on large scale around the world, due to its good corrosion resistant and easily machining qualities. It is also being used in cutting tools like; Knives, Daggers, Swords, Haircutting Scissors and Domestic scissors. It's grinding is easy and it produces a fine, vivid and smooth polished surface.

420 steel, due to its excellent harden-ability, it is capable of getting hardened up to 56 HRC Rockwell or higher depending upon carbon contents. Small sections can be air cooled and larger sections should be oil quenched for maximum hardness.

Heat Treatment

Sub-Critical Annealing:

Heat uniformly to 730 °C - 790 °C and hold until temperature is uniform throughout the section.

-Soak as required, cool in air.

Annealing

Heat uniformly to 840 °C - 900 °C and hold until temperature is uniform throughout the section.

-Soak as required. Cool in furnace.

Hardening

Heat to 950 °C - 1020 °C and hold until temperature is uniform throughout the section. Quench in oil or air cool. Temper immediately while still hand touch warm.

Note:

Hardening from 1020 °C - 1060 °C will give optimum corrosion resistance, but hardening up to 980 °C will give the best combination of corrosion resistance and mechanical properties.

Tempering

Min – Max: Heat to 650 °C - 750 °C and hold until temperature is uniform throughout the section.

-Soak as required. Cool in air.

Tempering within the range 150 °C - 200 °C will give optimum corrosion resistance and maximum hardness - up to 54 HRC depending upon section size. Tempering however within the range 400 °C - 550 °C should be avoided due to temper brittleness, resulting in a considerable reduction in impact resistant properties and loss of corrosion resistance.

*Heating temperatures, rates of heating, cooling and soaking times will vary due to factors such as work piece size / shape, also furnace type employed, quenching medium and work piece transfer facilities etc.



Machining

420 is machine-able in both the hardened and tempered conditions such as drilling, turning and bending. But it is recommended that machining in hardened condition should be avoided.

Welding

420 is not generally recommended for welding in either the annealed or hardened and tempered conditions, due to its air hardening capability which can lead to the formation of brittleness, resulting in cold cracking due to contraction stresses within the weld and heat affected zones. The higher the carbon content, the higher the hardening capability and greater risk of cracking. But despite all this, it is still easy to weld as compared to 440C grade.

Pre heating and inter-pass temperature control during welding, plus very slow cooling and post-weld annealing is the best method to prevent cracking.

Composition

Chemical Composition ranges of 420 J2 stainless steel

Grade 420 J2		
Ingredients	Min.	Max.
Carbon	0.15	0.36
Manganese	-	1.00
Silicon	-	1.00
* Nickel	-	1.00
Phosphorus	-	0.04
Sulphur	-	0.03
Chromium	12.00	14.00

*Nickel addition is optional.

420 Related Specifications

USA	Germany	Japan	Australia	Great Britain
ASTM A276-98b 420 SAE 51420 AISI 420 UNS S42000	W.Nr 1.4021 X20Cr13 W.Nr 1.4028 X30Cr13	JIS G4303 SuS 420 J1 and SUS 420 J2	AS 2837-1986 420	BS970 Part3 1991 420S37 BS970 Part4 1970/73 420S45 BS970 1955 EN56C and EN56D

