

## SS 420, Type 420, WNR 1.4021, UNS S42000, AISI 420, Grade 420, AFNOR Z20C13

### Introduction :

Grade 420 can be hardened through heat treatment, like any other stainless steel. It has high carbon steel with minimum 12% chromium content. When the stainless steel 420 is polished, surface grounded or hardened it offers good ductility in its annealed state and excellent corrosion resistance properties. Among all the stainless steel grades with 12% chromium grade has the highest hardness i.e 50HRC. The other versions of grade 420, having vanadium, sulphur and molybdenum in their composition, and grade 440 series are similar to grade 420 stainless steels include martensitic steels. Grade 420 has little higher carbon content than that of non-standard grade 420C. It is resistant to fresh water, alkalis, air, foods and mild acids, under hardened conditions. under annealed conditions, the corrosion resistance properties of grade 420 tends to fall. SS 420 material corrosion resistance is lower than that of grade 430 & grade 410 steels and other austenitic grades 17% chromium.

### Chemical Composition

|            | SS 420    | TYPE 420  | WNR 1.4021 | UNS S42000 | AISI 420  | GRADE 420 | AFNOR Z20C13 |
|------------|-----------|-----------|------------|------------|-----------|-----------|--------------|
| Carbon     | 0.15 min  | 0.15 min  | 0.15 min   | 0.15 min   | 0.15 min  | 0.15 min  | 0.15 min     |
| Manganese  | 1.00 max  | 1.00 max  | 1.00 max   | 1.00 max   | 1.00 max  | 1.00 max  | 1.00 max     |
| Phosphorus | 0.040 max | 0.040 max | 0.040 max  | 0.040 max  | 0.040 max | 0.040 max | 0.040 max    |
| Sulfur     | 0.03 max  | 0.03 max  | 0.03 max   | 0.03 max   | 0.03 max  | 0.03 max  | 0.03 max     |
| Silicon    | 1.00 max  | 1.00 max  | 1.00 max   | 1.00 max   | 1.00 max  | 1.00 max  | 1.00 max     |
| Chromium   | 12.0-14.0 | 12.0-14.0 | 12.0-14.0  | 12.0-14.0  | 12.0-14.0 | 12.0-14.0 | 12.0-14.0    |

### Mechanical Properties

|                           | SS 420  | TYPE 420 | WNR 1.4021 | UNS S42000 | AISI 420 | GRADE 420 | AFNOR Z20C13 |
|---------------------------|---------|----------|------------|------------|----------|-----------|--------------|
| UTS ksi [Mpa]             | 85[586] | 85[586]  | 85[586]    | 85[586]    | 85[586]  | 85[586]   | 85[586]      |
| 0.2% YS ksi [Mpa]         | 40[276] | 40[276]  | 40[276]    | 40[276]    | 40[276]  | 40[276]   | 40[276]      |
| Elongation% in 2"(50.8mm) | 25      | 25       | 25         | 25         | 25       | 25        | 25           |
| Reduction in Area, %      | -       | -        | -          | -          | -        | -         | -            |
| Hardness, Rockwell B      | 88      | 88       | 88         | 88         | 88       | 88        | 88           |

### Standard Available in forms :

- ASTM A182/ ASME SA182 Stainless Steel Pipe Fittings
- ASTM A213 / ASME SA213 Seamless Stainless Steel Pipes
- ASTM A240/ ASME SA240 Stainless Steels Sheets / Plates
- ASTM A249/ ASME SA249 Stainless Steel Welded Tubes
- ASTM A269/ ASME SA269 Stainless Steel Tubes
- ASTM A270/ ASME SA270 Stainless Steel Sanitary Tubes
- ASTM A312/ ASME SA312 Stainless Steel Pipes
- ASTM A403/ ASME SA403 Stainless Steel Pipe Fittings
- ASTM A554/ ASME SA554 Stainless Steel Welded Tubes
- ASTM A731/ ASME SA731 Stainless Steel Pipes
- ASTM A789/ ASME SA789 Stainless Steel Tubes
- ASTM A790/ ASME SA790 Stainless Steel Pipes
- ASTM A791/ ASME SA791 Stainless Steel Tubes

## Products Available in forms :

- SS 420, Type 420, WNR 1.4021, UNS S42000, AISI 420 Plates
- SS 420, Type 420, WNR 1.4021, UNS S42000, AISI 420 Pipes
- SS 420, Type 420, WNR 1.4021, UNS S42000, AISI 420 Round Bar
- SS 420, Type 420, WNR 1.4021, UNS S42000, AISI 420 Tube
- SS 420, Type 420, WNR 1.4021, UNS S42000, AISI 420 Flanges
- SS 420, Type 420, WNR 1.4021, UNS S42000, AISI 420 Wire
- SS 420, Type 420, WNR 1.4021, UNS S42000, AISI 420 Fittings

## Corrosion Resistance

- Under hardened conditions, grade 420 steels are resistant to fresh water, alkalis, air, foods and mild acids.
- The steel grades with a smooth surface finish have excellent performance.
- The corrosion resistance properties of grade 420 will tend to fall under annealed conditions.
- The corrosion resistance of grade 420 is lower than that of the grade 430 Ferritic alloys with 17% chromium, grade 410 steels and other austenitic grades.
- This steel grade finds application in cutlery such as carving knives, table knives and so on.
- Grade 420 steels have good corrosion resistance against food, but continuous exposure of metals to unwashed food substances can lead to pitting corrosion.

## Heat Resistance

- Grade 420 stainless steels have a scaling resistance at temperatures of up to 650°C.
- However, temperatures above standard tempering temperature are not suitable for this grade.

## Heat Treatment

### Annealing -

- Grade 420 stainless steels can be heated at temperatures from 840 to 900°C, followed by slow furnace cooling at 600°C and then air-cooling.

### Process Anneal -

- Grade 420 can be annealed at 735 to 785°C and air-cooled.

### Hardening -

- This process involves heating grade 420 steels at 980 to 1035°C, followed by air or oil quenching.
- Oil quenching is usually preferred for heavy metal sections.
- Tempering is performed at 150 to 370°C to achieve high hardness and good mechanical properties.
- Grade 420 should not be tempered between 425 and 600°C.

## Welding

- Grade 420 stainless steels are welded using welding rods, coated with grade 420 metals, to achieve high-strength joints.
- During the process, steels are pre-heated at 150 to 320°C and post-heated to 610 to 760°C. In the "as welded" condition, parts are welded using grade 309 filler rods to achieve ductile joints.
- However, grade 309 electrodes or rods are recommended for welding grade 420 steels by AS 1554.6.

## Machining

- Grade 420 steels can be easily machined in their annealed state, but they are difficult to machine having a hardness greater than 30HRC.
- One of the most readily available machined alternatives is the free-machining grade 416 steels.

## Applications

- Shear blades
- Needle valves
- Surgical equipment
- Cutlery



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