

Description

Stainless Steel Grade 420C/1.4021 is a high-carbon martensitic stainless steel that provides high strength, hardness, and wear resistance. It is capable of being hardened through heat treatment and offers a good combination of corrosion resistance and toughness. This grade is widely used in applications that require both high mechanical properties and moderate corrosion resistance.

Chemical Composition

- Chromium (Cr): 12.0 - 14.0%
 - Carbon (C): 0.15 - 0.40%
 - Manganese (Mn): $\leq 1.0\%$
 - Silicon (Si): $\leq 1.0\%$
 - Phosphorus (P): $\leq 0.040\%$
 - Sulfur (S): $\leq 0.030\%$
 - Iron (Fe): Balance
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Mechanical Properties

- Tensile Strength: 650 - 880 MPa
 - Yield Strength: 450 - 650 MPa
 - Elongation at Break: 20 - 30%
 - Hardness: 50 - 55 HRC (when heat-treated)
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Thermal & Physical Properties

- Melting Point: 1480 - 1530°C
- Density: 7.75 g/cm³
- Thermal Conductivity: 24.9 W/m·K at 100°C
- Specific Heat: 460 J/kg·K
- Electrical Resistivity: 600 nΩ·m

Other Designations

- UNS: S42000
- EN: 1.4021
- JIS: SUS 420J1
- AISI: 420
- BS: 420S29

Fabrication and Heat Treatment

- Machinability: Grade 420C/1.4021 is readily machinable in its annealed state. It requires slow speeds and constant feeds to minimize the risk of work hardening.
- Formability: It can be formed using conventional methods but has limited cold forming capabilities due to its high strength and hardness.
- Welding: Preheating and post-weld heat treatment are recommended to reduce the risk of cracking. Common welding methods include TIG, MIG, and resistance welding.
- Heat Treatment:
 - Annealing: Heat to 840-900°C, then cool slowly in the furnace.
 - Hardening: Heat to 980-1050°C, followed by air cooling or oil quenching.
 - Tempering: Heat to 150-370°C to achieve desired hardness and mechanical properties.

Applications

- Cutlery: High-quality knives and blades.
 - Surgical Instruments: Scalpels and other medical tools requiring sharpness and strength.
 - Industrial Tools: Shear blades, cutting tools, and industrial knives.
 - Automotive: Parts requiring high wear resistance and moderate corrosion resistance.
 - Valves and Pumps: Components that require high strength and wear resistance.
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Supplied Forms

- Bars
 - Coils
 - Wires
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Features

- High Hardness and Strength: Capable of achieving high levels of hardness through heat treatment, making it ideal for cutting tools and blades.
- Good Wear Resistance: Suitable for applications involving abrasive environments.
- Moderate Corrosion Resistance: Adequate for environments where corrosion is not severe.
- Heat Treatable: Can be hardened to increase strength and durability.
- Magnetic Properties: Magnetic in all conditions.

