

Description

Stainless Steel Grade 420A/1.4021 is a martensitic stainless steel with a high carbon content, providing high hardness and strength after heat treatment. Known for its excellent corrosion resistance, particularly in mild environments, 420A is commonly used in applications requiring high wear resistance and moderate corrosion resistance. The alloy is versatile, allowing for easy fabrication and is widely employed in industries such as cutlery, surgical instruments, and other tool manufacturing.

- DIN Number: 1.4021
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Chemical Composition

- Chromium (Cr): 12.0 - 14.0%
 - Carbon (C): 0.16 - 0.25%
 - Manganese (Mn): $\leq 1.00\%$
 - Silicon (Si): $\leq 1.00\%$
 - Phosphorus (P): $\leq 0.040\%$
 - Sulfur (S): $\leq 0.030\%$
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Mechanical Properties

- Tensile Strength: 700 - 950 MPa
 - Yield Strength: 345 MPa (min)
 - Elongation at Break: 20% (in 50 mm)
 - Hardness: 50 HRC (max, after heat treatment)
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Thermal & Physical Properties

- Density: 7.74 g/cm³
- Thermal Conductivity: 24.9 W/m·K (at 100°C)
- Specific Heat Capacity: 460 J/kg·K
- Modulus of Elasticity: 200 GPa

- Electrical Resistivity: 0.55 $\mu\Omega\cdot\text{m}$
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Other Designations

- UNS: S42000
 - AISI: 420
 - JIS: SUS 420J1
 - EN: X20Cr13
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Fabrication and Heat Treatment

- Annealing: Heat to 840-900°C, hold until the temperature is uniform throughout the section, and cool in furnace.
 - Hardening: Heat to 980-1035°C, hold until the temperature is uniform throughout the section, and quench in oil or air. Follow with tempering at a suitable temperature.
 - Tempering: Heat to 150-370°C, hold for 1 hour per 25 mm of thickness, then air cool.
 - Machining: Can be machined in the annealed condition but becomes challenging after hardening. Use carbide tools for better results.
 - Welding: Welding is generally not recommended, but if necessary, preheat to 150-320°C and post-weld heat treatment is required to prevent cracking.
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Applications

- Cutlery: Blades, scissors, and other cutting tools.
 - Surgical Instruments: Forceps, scalpels, and other precision tools.
 - Industrial Blades: Used in food processing, paper, and plastics industries.
 - Valves and Pump Shafts: Where high wear resistance and moderate corrosion resistance are required.
 - Hand Tools: Screwdrivers, pliers, and other tools requiring good hardness.
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Supplied Forms

- Bars
 - Coils
 - Wires
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Features

- High Hardness: Achieves high hardness and wear resistance after heat treatment, making it suitable for cutting and wear applications.
- Good Corrosion Resistance: Provides moderate resistance to corrosion, particularly in fresh water and mild acidic environments.
- High Strength: Offers excellent strength, especially after hardening and tempering.
- Machinability: Relatively easy to machine in the annealed state, though it becomes more difficult after hardening.
- Versatile: Suitable for a wide range of applications across various industries

