

Description

Stainless Steel Grade 420BF/1.4021 is a martensitic stainless steel known for its high carbon content and excellent hardness. This grade is primarily used in applications requiring high strength, wear resistance, and moderate corrosion resistance. The "BF" designation indicates that this steel has been optimized for better machinability, making it easier to work with in manufacturing processes. It is widely used in the production of cutting tools, industrial blades, and various components that require high durability and sharpness.

Chemical Composition

- Carbon (C): 0.26% - 0.40%
 - Chromium (Cr): 12.0% - 14.0%
 - Manganese (Mn): $\leq 1.0\%$
 - Silicon (Si): $\leq 1.0\%$
 - Nickel (Ni): $\leq 1.0\%$
 - Phosphorus (P): $\leq 0.04\%$
 - Sulfur (S): $\leq 0.03\%$
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Mechanical Properties

- Tensile Strength: 650 - 850 MPa
 - Yield Strength: 450 - 600 MPa
 - Elongation: 15% - 20%
 - Hardness: 200 - 250 HB (Brinell Hardness)
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Thermal & Physical Properties

- Density: 7.75 g/cm³
- Thermal Conductivity: 24 W/m·K
- Coefficient of Thermal Expansion: $10.0 \times 10^{-6} /K$ (20-100°C)

- Specific Heat: 460 J/kg·K
 - Electrical Resistivity: 600 nΩ·m
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Other Designations

- DIN Number: 1.4021
 - UNS Number: S42000
 - EN: X20Cr13
 - AISI: 420
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Fabrication and Heat Treatment

- Formability: 420BF stainless steel can be formed using conventional methods. However, it requires more force than austenitic stainless steels due to its higher strength and hardness.
 - Weldability: Not commonly welded due to the risk of cracking. If welding is necessary, pre-heating and post-weld heat treatment are recommended to maintain mechanical properties.
 - Heat Treatment:
 - Annealing: Heat to 840-900°C, then cool slowly in the furnace.
 - Hardening: Heat to 950-1050°C, then quench in oil or air. Tempering is required to achieve the desired hardness and toughness.
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Applications

- Cutlery: High-quality knives and blades.
 - Surgical Instruments: Scalpels, scissors, and other cutting tools.
 - Industrial Blades: Used in paper, plastic, and food processing industries.
 - Automotive Components: Valve components and other parts requiring high wear resistance.
 - Tools: Hand tools and other cutting implements.
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Supplied Forms

- Bars
 - Coils
 - Wires
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Features

- High Hardness: Excellent hardness after heat treatment, making it suitable for wear-resistant applications.
- Good Corrosion Resistance: Offers moderate resistance to corrosion in mild environments.
- High Machinability: Improved machinability compared to other martensitic stainless steels.
- Versatile Application: Used in a wide range of industries, from cutlery to automotive components.

