

Description

Stainless Steel Grade 440B/1.4112 is a high-carbon martensitic stainless steel known for its high hardness and excellent wear resistance. It is widely used in applications that require strength and resistance to wear and abrasion. 440B offers a balance between toughness and hardness, making it suitable for demanding applications. It is often used in components where superior mechanical properties and resistance to wear are critical.

Chemical Composition

- Chromium (Cr): 16.0 - 18.0%
 - Carbon (C): 0.75 - 0.95%
 - Manganese (Mn): $\leq 1.0\%$
 - Silicon (Si): $\leq 1.0\%$
 - Phosphorus (P): $\leq 0.040\%$
 - Sulfur (S): $\leq 0.030\%$
 - Nickel (Ni): $\leq 0.75\%$
-

Mechanical Properties

- Tensile Strength: 750 - 950 MPa (110 - 140 ksi)
 - Yield Strength: 500 - 750 MPa (73 - 109 ksi)
 - Elongation: $\geq 10\%$ in 50 mm (2 in)
 - Hardness: 56 - 60 HRC (Rockwell Hardness Scale)
 - Impact Toughness: Moderate, decreases with increased hardness
-

Thermal & Physical Properties

- Density: 7.75 g/cm³ (0.28 lb/in³)
- Thermal Conductivity: 25.4 W/m·K (17.6 BTU·in/h·ft²·°F)
- Specific Heat Capacity: 0.460 J/g·K (0.11 BTU/lb·°F)

- Melting Point: Approx. 1400 - 1450°C (2552 - 2642°F)
 - Thermal Expansion: 11.0 $\mu\text{m}/\text{m}\cdot\text{K}$ (6.1 $\mu\text{in}/\text{in}\cdot^\circ\text{F}$)
-

Other Designations

- DIN Number: 1.4112
 - AISI Number: 440B
 - UNS Number: S44003
 - JIS Number: SUS 440B
-

Fabrication and Heat Treatment

- Annealing: Heat to 870 - 900°C (1600 - 1650°F), followed by air cooling to relieve stresses and improve machinability.
 - Quenching: Heat to 1040 - 1065°C (1900 - 1950°F) and quench in oil or air to achieve high hardness.
 - Tempering: After quenching, temper at 150 - 200°C (300 - 390°F) to reduce brittleness and enhance toughness.
 - Machining: Can be machined with standard techniques; however, care should be taken to manage tool wear due to high hardness.
-

Applications

- Cutting Tools: Manufacturing of knives, blades, and other cutting tools.
 - Bearings: High-performance bearings in harsh environments.
 - Valves and Pumps: Components in oil and gas, and other industries requiring wear resistance.
 - Surgical Instruments: Instruments that require high hardness and sharpness.
 - Fasteners: High-strength bolts, screws, and other fasteners in demanding applications.
-

Supplied Forms

- Bars: Round, square, and hexagonal bars
 - Rod: Solid rods of various diameters
 - Custom Shapes: Machined to specific designs as required
-

Features

- High Hardness: Achieves a hardness of up to 60 HRC, providing exceptional wear resistance.
- Corrosion Resistance: Good resistance to corrosion, though less than 316 stainless steel.
- Wear Resistance: Excellent resistance to wear and abrasion, ideal for high-wear applications.
- Toughness: Balances hardness with toughness, suitable for components subject to mechanical stress.
- Polishability: Can be polished to a high finish for aesthetic applications.

