

## Description

Stainless Steel Grade 441/1.4509 is a ferritic stainless steel with enhanced strength and corrosion resistance, specifically designed to withstand high-temperature applications. It is characterized by its low carbon content and addition of titanium, which improves its resistance to oxidation and scaling. This grade is commonly used in automotive exhaust systems and other high-temperature applications due to its excellent durability and resistance to thermal expansion.

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## Chemical Composition

- Chromium (Cr): 17.0 - 19.0%
  - Nickel (Ni):  $\leq 0.60\%$
  - Titanium (Ti): 0.15 - 0.30%
  - Carbon (C):  $\leq 0.12\%$
  - Manganese (Mn):  $\leq 1.00\%$
  - Silicon (Si):  $\leq 1.00\%$
  - Phosphorus (P):  $\leq 0.040\%$
  - Sulfur (S):  $\leq 0.030\%$
  - Nitrogen (N):  $\leq 0.10\%$
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## Mechanical Properties

- Tensile Strength: 450 - 600 MPa
  - Yield Strength: 275 MPa (min.)
  - Elongation:  $\geq 20\%$  in 50 mm
  - Hardness (Brinell):  $\leq 230$  HB
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## Thermal & Physical Properties

- Density: 7.75 g/cm<sup>3</sup>
- Melting Point: 1400 - 1450°C

- Thermal Conductivity: 24.2 W/m·K at 100°C
  - Specific Heat Capacity: 500 J/kg·K
  - Coefficient of Thermal Expansion:  $10.8 \times 10^{-6}$  /K (at 20°C)
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## Other Designations

- DIN Number: 1.4509
  - UNS Number: S44100
  - JIS Number: SUS441
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## Fabrication and Heat Treatment

- Machinability: Moderate; machining operations should be carried out with appropriate tools to prevent tool wear.
  - Welding: Can be welded using standard techniques; pre-heating and post-weld heat treatment may be required to avoid cracking.
  - Heat Treatment: Annealing is typically performed at temperatures of 850 - 950°C, followed by rapid cooling. This treatment helps to achieve the desired mechanical properties and relieve stresses.
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## Applications

- Automotive: Exhaust systems, catalytic converters, and heat shields.
  - Industrial: Furnace components, heating elements, and other high-temperature equipment.
  - Marine: Components exposed to high temperatures and corrosive environments.
  - Construction: Architectural panels and facades requiring enhanced durability.
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## Supplied Forms

- Bars
- Rounds

- Hexagons
  - Squares
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## Features

- High-Temperature Resistance: Suitable for applications involving elevated temperatures due to its excellent oxidation resistance.
- Corrosion Resistance: Good resistance to oxidation and corrosion in various environments.
- Strength: Offers a high tensile strength and resistance to deformation under stress.
- Stability: Maintains dimensional stability at high temperatures, reducing the risk of warping or distortion.

