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# 416 STAINLESS STEEL, UNS S41600

Wire, AMS 5610, ASTM A582, QQ-S-764, Mil-W-5263

## Applications

Type 416 stainless steel is used for shafts, axles, gears, screws, bolts and any part that requires considerable machining. Should not be used for vessels under high pressures.

## Description

Type 416 stainless steel is a martensitic, free machining grade that can be hardened by heat treating to increase strength and hardness. The alloy exhibits machinability that is better than austenitic grades but sacrifices corrosion resistance.

## Chemistry Typical

Carbon: 0.15 max  
Phosphorus: 0.060 max  
Silicon: 1.00 max  
Manganese: 1.25 max  
Sulfur: 0.150 min  
Chromium: 12.00-14.00

## Physical Properties

Density: 0.282 lbs/in<sup>3</sup> 7.80 g/cm<sup>3</sup>

Electrical Resistivity: ohm-cir-mil/ft:  
At 70 °F (21 °C): 343.0

Specific Heat: BTU/lb-°F (J/g-°C):  
32 - 212 °F (0 - 100 °C): 0.110 (0.460)

Thermal Conductivity: BTU-in//hr-ft<sup>2</sup>-°F (W/m•K)  
At 200 °F (94 °C): 172.8 (24.9)  
At 1000 °F (538 °C): 198 (28.5)

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Mean Coefficient of Thermal Expansion:  $\mu\text{in/in-}^\circ\text{F}$  ( $\mu\text{m/m-}^\circ\text{C}$ )

32 - 212 °F (0 - 100 °C): 5.50 (9.90)

32 - 600 °F (0 - 316 °C): 5.60 (10.1)

32 - 1200 °F (0 - 649 °C): 6.5 (11.7)

Modulus of Elasticity: KSI (MPa)

$29.0 \times 10^3$  ( $200 \times 10^3$ ) in tension

Melting Range: 2700 - 2790 °F (1488 - 1530 °C)

## Forms

Sheet, Strip, Plate – Inquiry with Ulbrich Stainless Steel Sales

Wire – Profile, Round, Square

Rectangular cross sections – Inquiry with Ulbrich Shaped Wire Sales

## Mechanical Properties at Room Temperature

### Properties: Annealed

Ultimate Tensile Strength: 75 KSI min (517 MPa min)

Yield Strength: 40 KSI min ( 276 MPa min)

Elongation: 30 % min

### Properties: Tempered

Type 416 can be cold worked to various tempers. Contact Ulbrich Shaped Wire Technical Service for additional information.

## Additional Properties

### Corrosion Resistance

Refer to NACE (National Association of Corrosion Engineers) for recommendations.

### Wire Finishes

XC – Extra clean bright annealed or bright annealed and cold rolled

Grease – Ultra-bright finish (for decorative applications)

Soap – Soap is not removed from tempered wire to act as a lubricant.

\* *Contact Ulbrich Wire with special finish requests.*

### Heat Treatment

Type 416 can be hardened by cold working and by heat treatment.

### Welding

For best results refer to: SSINA's "Welding of Stainless Steels and Other Joining Methods".

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