420 Stainless Steel, UNS S42000

Shaped, Flat, Square, Round, Fine Wire, Plated and Bare Wire
AMS 5506, AMS 5621, ASTM A-176, ASTM A 580

420 Alloy Description

Alloy 420 a martensitic stainless steel that provides good corrosion resistance similar to alloy 410 with an increase strength and hardness. It is magnetic in both the annealed and hardened conditions. Maximum corrosion resistance is attained only in the fully hardened condition.

Applications

Cutlery
Surgical and dental instruments
Firearm parts
Scissors
Tapes
Straight edges

Chemistry Typical

Carbon: 0.30-0.40
Manganese: 1.00 max
Silicon: 1.00 max
Chromium: 12.00-14.00
Nickel: 0.50 max
Molybdenum: 0.50 max
Phosphorus: 0.040 max
Sulfur: 0.030 max
Copper: 0.50 max
Aluminum: 0.15 max
Tin: 0.050 max
Iron: Balance

Physical Properties
Density: 0.28 lbs/in³, 7.74 g/cm³

Electrical Resistivity: microhm-in (microhm-cm):
68°F (20°C): 21.71 (55.0)

Specific Heat: BTU/lb/°F (kJ/kg•K):
32-212°F (0-100°C): 0.11 (0.46)

Thermal Conductivity: BTU/hr/ft²/ft/°F (W/m•K)
At 212°F (100°C): 14.4 (24.9)
At 932°F (500°C): 16.6 (28.7)

Mean Coefficient of Thermal Expansion: in/in/°F (μm/m•K)
32 – 212°F (0 -100°C): 5.7 x 10⁻⁶ (10.2)
32 – 1200°F (0 -649°C): 6.8 x 10⁻⁶ (12.1)

Modulus of Elasticity: KSI (MPa)
29.0 x 10³ (200 x 10³) in tension

Magnetic Permeability: Magnetic

Melting Range: °F (°C) 2723 (1495)

Mechanical Properties at Room Temperature
Properties: Annealed Typical
Ultimate Tensile Strength: 100 KSI max (690 MPa max)
Yield Strength (0.2% offset): 60 KSI max (414 MPa max)
**Elongation:** 15% min  
**Hardness:** B 96 max

**Properties: Tempered**  
Alloy 420 can be cold rolled to achieve the temper properties required by specific customers and/or manufacturing requirements. Contact Ulbrich Wire for details.

**Additional Properties**

**Corrosion Resistance**  
Alloy 420 provides full corrosion resistance only in the hardened or hardened and tempered. In these conditions, its corrosion resistance is similar to type 410. Refer to NACE (National Association of Corrosion Engineers) for recommendations.

**Standard Wire Finishes**  
**Extra Clean:** Extra clean is also referred to as “bright annealed” or “bright annealed and cold rolled”

**Grease (round wire only):** Drawn in a heavy grease produces an “Ultra bright” finish for decorative applications

**Soap (round wire only):** Soap is used as a lubricant in the drawing process and is not removed. It acts as a lubricant during customer part forming operation. A soap finish is available in tempered products.

**Plated:** Many plating options are available.

*Special finishes are available: Contact Ulbrich Wire Sales with special finish and plating requests.

**Forms**

- Continuous Coils
- Cut to lengths
- Precision cutting

**Cold Forming**  
Alloy 420 can be moderately drawn and formed in the annealed condition.

**Heat Treatment**  
Alloy 420 can be hardened by cold working and by heat treating. Please refer to Ulbrich
Technical Services Department for more information. Alloy 420 is capable of being heat treated to a hardness of HRC 51 minimum.

Welding

The martensitic class of stainless steels has limited weldability due to its hardenability. For best results refer to: SSINA's “Welding of Stainless Steels and Other Joining Methods”.

Limitation of Liability and Disclaimer of Warranty: In no event will Ulbrich Stainless Steels and Special Metals, Inc., be liable for any damages arising from the use of the information included in this document or that it is suitable for the ‘applications’ noted. We believe the information and data provided to be accurate to the best of our knowledge but, all data is considered typical values only. It is intended for reference and general information and not recommended for specification, design or engineering purposes. Ulbrich assumes no implied or express warranty in regard to the creation or accuracy of the data provided in this document.

Copyright© January 2014 Ulbrich Stainless Steels & Special Metals, Inc. – Revision 6.1.2015