



# Custom 455®, UNS S45500

Shaped, Flat, Square, Round, Fine Wire, Plated and Un-plated

Specifications: AMS 5617, AMS 5860, ASTM A313 ASTM A564, ASTM A693

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## Custom 455® Alloy Description



Custom 455® stainless steel, a martensitic stainless steel.

This alloy is relatively soft and formable in the annealed condition but using a single-step aging treatment the alloy develops exceptionally high yield strength with good ductility and toughness. It provides high strength with good corrosion resistance to atmospheric environments.

## Applications

Medical devices

Medical instrument

Needles

Pins

## Chemistry Typical

Carbon: 0.05 max

Manganese: 0.50 max

Phosphorus: 0.040 max

Sulfur: 0.030 max

Silicon: 0.50 max

Chromium: 11.00-12.50

Nickel: 7.50-9.50

Molybdenum: 0.50 max

Copper: 1.50-2.50

Columbium + Tantalum: 0.10-0.50

Titanium: 0.080-1.40

Iron: Balance

## Physical Properties

Density: 0.280 lb/in<sup>3</sup>, 7.75 g/cm<sup>3</sup>

Electrical Resistivity: ohm-cir-mil/ft

At 70°F, Condition A: 545.0

At 70°F, Condition H 950: 456.0

Thermal Conductivity: BTU-in/hr-ft<sup>2</sup>-°F

At 212°F: 125.0

At 392°F: 137.0

At 572°F: 148.0

At 752°F: 162.0

At 932°F: 172.0

Mean Coefficient of Thermal Expansion: in/in-°F

75-200°F:  $5.90 \times 10^{-6}$

75-300°F:  $6.03 \times 10^{-6}$

75-500°F:  $6.20 \times 10^{-6}$

75-700°F:  $6.45 \times 10^{-6}$

75-900°F:  $6.687 \times 10^{-6}$

Modulus of Elasticity: KSI (MPa)

$29 \times 10^3$  ( $200 \times 10^3$ ) in tension

## Mechanical Properties at Room Temperature

### **Properties: Annealed Typical**

At gauge: 0.160 inches (4.06 mm)

Ultimate Tensile Strength: 160 KSI (1103 MPa)

Yield Strength: 135 KSI (930 MPa)

Elongation: 8 %

Hardness: Rc 33

**At gauge: 0.050 inches (1.27 mm)**

Ultimate Tensile Strength: 160 KSI (1103 MPa)

Yield Strength: 150 KSI (1034 MPa)

Elongation: 6%

Hardness: Rc 34

**Properties Tempered**

Custom 455® can be cold rolled to achieve the temper properties required by specific customers and/or manufacturing requirements. Contact Ulbrich Wire for details.

**Age Hardened: Typical**

H900: At gauge: 0.160 inches (4.06 mm)

Ultimate Tensile Strength: 260 KSI (1792 MPa)

Yield Strength: 205 KSI (1724 MPa)

Elongation: 3%

Hardness: Rc 51

**H900: At gauge: 0.050 inches (1.27 mm)**

Ultimate Tensile Strength: 260 KSI (1792 MPa)

Yield Strength: 250 KSI (1724 MPa)

Elongation: 3%

Hardness: Rc 51

**H950: At gauge: 0.160 inches (4.06 mm)**

Ultimate Tensile Strength: 250 (1724 MPa)

Yield Strength: 240 (1655 MPa)

Elongation: 4%

Hardness: Rc 48

**H950: At gauge: 0.050 inches (1.27 mm)**

Ultimate Tensile Strength: 250 KSI (1724 MPa)

Yield Strength: 240 KSI (1655 MPa)

Elongation: 4%

Hardness: Rc 47

### **H1000 At gauge: 0.160 inches (4.06 mm)**

Ultimate Tensile Strength: 220 KSI (1517 MPa)

Yield Strength: 210 KSI (1448 MPa)

Elongation: 6%

Hardness: Rc 46

### **H1000 At gauge: 0.050 inches (1.27 mm)**

Ultimate Tensile Strength: 220 KSI (1517 MPa)

Yield Strength: 210 KSI (1448 MPa)

Elongation: 5%

Hardness: Rc 44

## Additional Properties

### **Corrosion Resistance**

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

## Heat Treatment

Custom 455® can be hardened by cold working and with a heat treatment.

## Welding

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

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