Ulbrich Stainless Steels & Special Metals, Inc. • 153 Washington Avenue • North Haven, CT 06473 USA • 800-243-1676 • ULBRICH.com

WASPALOY®, UNS N07001

Strip, Coil, Foil, Wire, AMS 5544

Applications

Gas turbine part and after burner components

Description

Waspaloy® is a nickel-base alloy with excellent high temperature strength and good resistance to oxidation at temperatures up to 1600 °F. Waspaloy has higher stability and strength ranges than those available for alloy 718. Waspaloy can be heat treated in three-steps: solution treatment, stabilisation and age-hardening.

Chemistry Typical

Nickel: Balance
Chromium: 18.00-21.00
Cobalt: 12.00-15.00
Titanium: 2.75-3.25
Aluminum: 1.20-1.60
Bornon: 0.003-0.01
Carbon: 0.020-0.10
Zirconium: 0.02-0.08
Iron: 3.00 max
Magnanese: 0.10 max
Silicon: 0.15 max
Phosphorus: 0.015 max
Sulfur: 0.015 max

Physical Properties

Density: 0.296 lbs/in³, 8.20 g/cm³

Waspaloy® is a registered trademark of United Technologies Corp

Mean Coefficient of Thermal Expansion: µin/in-°F (µm/m-°C)
70 - 800 °F (20 - 500 °C): 7.6 (13.9)
70 - 1000 °F (20 - 600 °C): 7.8 (14.3)
70 - 1200 °F (20 - 700 °C): 8.1 (14.8)
70 - 1400 °F (20 - 800 °C): 8.4 (15.4)
70 - 1600 °F (20 - 900 °C): 8.9 (16.4)
70 - 1800 °F (20 - 1000 °C): 9.7 (17.8)

Thermal Conductivity: BTU-in/ft-°F (W/m-°K)
70 °F (21 °C): 79 (11)
800 °F (427 °C): 113 (16)
1200 °F (649 °C): 138 (20)
1500 °F (816 °C): 160 (23)
1800 °F (982 °C): 182 (26)

Modulus of Elasticity, ksi (MPa)
30.9 x 10^3 (213 x 10^3) in tension

Melting Point: 2425 - 2475 °F (1330 - 1357 °C)

Forms

Coil – Strip, Foil, Ribbon
Wire – Profile, Round, Flat, Square

Mechanical Properties at Room Temperature

Properties: Annealed (Strip and Foil)*

Ultimate Tensile Strength:
Gauges 0.012 inches and under (0.30 mm): 150 KSI max (1035 MPa max)
Yield Strength (0.2% offset):
Gauges 0.012 inches and under (0.30 mm): 85 KSI max (586 MPa max)
Elongation: 25% min
Hardness: B100 max

** Ulbrich cannot conform to AMS 5544 above .012" thicknesses.*

Properties: Tempered

No data available for cold rolled material.

Heat Treated Capabilities:

Heat treated per AMS 5544 and tested at room temperature

Ultimate Tensile Strength:
Gauges 0.020 inches and under (0.51 mm): 170 KSI min (1172 MPa min)
Gauges over 0.020 inches (051 mm): 175 KSI min (1206 MPa min)
Yield Strength (0.2% offset):
Gauges 0.020 inches and under (0.51 mm): 110 KSI min (759 MPa min)
Gauges over 0.020 inches (051 mm): 105 KSI min (724 MPa min)
Elongation:
Gauges 0.020 inches and under (0.51 mm): 15% min
Gauges over 0.020 inches (051 mm): 20% min
Hardness: Rc 34-44

Heat treated per AMS 5544 and tested at 1000°F (538°C)

Ultimate Tensile Strength:
Gauges 0.020 inches and under (0.51 mm): 145 KSI min (1000 MPa min)
Gauges over 0.020 inches (051 mm): 150 KSI min (1035 MPa min)
Yield Strength (0.2% offset):
Gauges 0.020 inches and under (0.51 mm): 100 KSI min (690 MPa min)
Gauges over 0.020 inches (051 mm): 105 KSI min (724 MPa min)
Elongation:
Gauges 0.020 inches and under (0.51 mm): 13% min
Gauges over 0.020 inches (051 mm): 25% min
Hardness: N/A

** Contact Ulbrich Shaped Wire Technical Service for information.*

Additional Properties

Corrosion Resistance

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

Finishes

#1 – Hot rolled annealed and descaled. It is available in strip, foil and ribbon. It is used for applications where a smooth decorative finish is not required.
#2D – Dull finish produced by cold rolling, annealing and descaling. Used for deep drawn parts and those parts that need to retain lubricants in the forming process.
#2B – Smooth finish produced by cold rolling, annealing and descaling. A light cold rolling pass is added after anneal with polished rolls giving it a brighter finish than 2D.

#BA – Bright annealed cold rolled and bright annealed
#CBA – Course bright annealed cold rolled matte finish and bright anneal
#2 – Cold Rolled
#2BA – Smooth finish produced by cold rolling and bright annealing. A light pass using highly polished rolls produces a glossy finish. A 2BA finish may be used for lightly formed applications where a glossy finish is desired in the formed part.
Polished – Various grit finish for specific polish finished requirements.

** Not all finishes are available for all alloys – Contact Ulbrich Sales for more information.*

Wire Finishes

XC – Extra clean. Bright annealed or bright annealed and cold rolled
Grease – Ultra bright finish for decorative applications
Soap – Soap coating on tempered wire to act as lubricant.

** Contact Ulbrich Wire for custom finishes.*

Cold Forming

Waspaloy® can be cold-formed in the annealed condition, and may also be hot-formed at temperatures of 1900 °F or above.

Welding

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