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

INCONEL® 718, UNS N07718

(Nickel 718) Strip, Coil, Foil, Wire, AMS 5596, AMS 5597, ASTM B670, WESTINGHOUSE NFD310021(NUCLEAR), UNE N07718

Applications

Honeycombs, bellows, seal rings

Description

Inconel® 718 is a nickel-chromium alloy being precipitation hardenable and having high creep-rupture strength at high temperatures to about 1300 °F (700 °C). The poor age-hardening response of alloy 718 permits annealing and welding without spontaneous hardening during heating and cooling. This alloy has excellent weldability compared to the nickel-base super alloys hardened by Aluminum and Titanium.

Chemistry Typical

Nickel + Cobalt: 50.00 – 55.00

Chromium: 17.00 – 21.00

Molybdenum: 2.80 – 3.30

Columbium + Tantalum: 4.75 – 5.50

Titanium: 0.65 – 1.15

Aluminum: 0.20 – 0.80

Cobalt: 1.00 max

Carbon: 0.80 max

Manganese: 0.35 max

Silicon: 0.35 max

Phosphorus: 0.015 max

Sulfur: 0.015 max

Boron: 0.006 max

Copper: 0.30 max

Iron: Balance

Inconel® 718 is a registered trademark of Haynes Alloys

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Physical Properties

Density: 0.296 lbs/in³, 8.19 g/cm³

Specific Heat: Btu/lb °F (J/kg °C):
At 70 °F (21 °C): 0.104 (435)

Mean Coefficient of Thermal Expansion: in/in/° (mm/m/°C)
70 - 212 °F (20 - 100 °C): 7.6×10^{-6} (13.0)

Modulus of Elasticity: KSI (MPa)
 29.7×10^3 (204.9×10^3) in tension

Magnetic Permeability, H = 200 Oersteds:
Annealed: 1.013
Annealed and Aged: 1.011

Melting Range: 2300 - 2437 °F (1260 - 1336 °C)

Forms

Coil – Strip, Foil, Ribbon

Wire – Profile, Round, Flat, Square

Mechanical Properties at Room Temperature

Annealed Typical

Ultimate Tensile Strength: 120 KSI min (827 MPa min)
Yield Strength: (0.2% offset) 60 KSI min (414 MPa min)
Elongation: 30% min (gauges: > 0.040 inches)

Tempered

Inconel® 718 can be cold rolled to various tempers. Contact Ulbrich Technical Service for additional information.

Heat Treat Capabilities

Two heat treatments are generally utilized for Inconel® 718:

Solution anneal at 1700 - 1850 °F followed by rapid cooling, usually in water, plus precipitation hardening at 1325 °F for 8 hours, furnace cool to 1150 °F, hold at 1150 °F for a total aging time of 18 hours, followed by air cooling.

Solution anneal at 1900 - 1950 °F followed by rapid cooling, usually in water, plus precipitation hardening at 1400 °F for 10 hours, furnace cool to 1200 °F, hold at 1200 °F for a total aging time of 20 hours, followed by air cooling.

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** Contact Ulbrich Technical Service for additional information.*

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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 in 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 Wire Sales for custom wire finishes.*

Heat Treatment

Inconel® 718 can be hardened by:

Cold Working

Age Hardening

Cold Working followed by Age Hardening

Welding

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

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