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

Limitation of Liability and Disclaimer of Warranty: In no event will Ulbrich Stainless Steels & 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 Revision 06.01.2015. Ulbrich Stainless Steels & Special Metals, Inc. All rights reserved.
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 x 10⁻⁶ (13.0)

Modulus of Elasticity: KSI (MPa)
29.7 x 10³ (204.9 x 10³) 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.

* Contact Ulbrich Technical Service for additional 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 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”.

Inconel® 718 is a registered trademark of Haynes Alloys