

Nickel IN718



Material description

IN718 is an iron-nickel base superalloy Ni3Nb as the hardening precipitate. This a high strength alloy with great resistance to corrosion, thanks to chromium, and exceptional performance at high temperature. These attributes make it possible for it to be used in compressor stage of jet engines, exhaust systems, oil and gas valves and other extreme conditions.

Physical properties¹

| | |
|---|--------------|
| Density (based on 8.19 g/cm³ theoretical density) | > 99.75% |
| Pore size | < 100 µm |
| Porosity rate | < 0.25% |
| Hardness | min. 80 HV10 |

Mechanical properties

| | As Built | Stress Relieved ² |
|--|--------------------------------------|--|
| Tensile strength Horizontal (XY) Vertical (Z) | 950 MPa ± 40 MPa 950 MPa ± 40 MPa | 1400 MPa ± 100 MPa 1400 MPa ± 100 MPa |
| Proof strength (Rp 0.2%) Horizontal (XY) Vertical (Z) | 640 MPa ± 50 MPa 640 MPa ± 50 MPa | 1150 MPa ± 100 MPa 1150 MPa ± 100 MPa |
| Modulus of elasticity Horizontal (XY) Vertical (Z) | 150 ± 20 GPa 150 ± 20 GPa | 170 ± 20 GPa 170 ± 20 GPa |
| Elongation at break Horizontal (XY) Vertical (Z) | 4.5 ± 2.1% 4.5 ± 2.1% | 15 ± 3% 11.6 ± 6.5% |

¹ All data gathered using ASTM E8M flat un-machined specimens that were wire EDM to profile with cross section of 2mmx6mm at the gauge section.

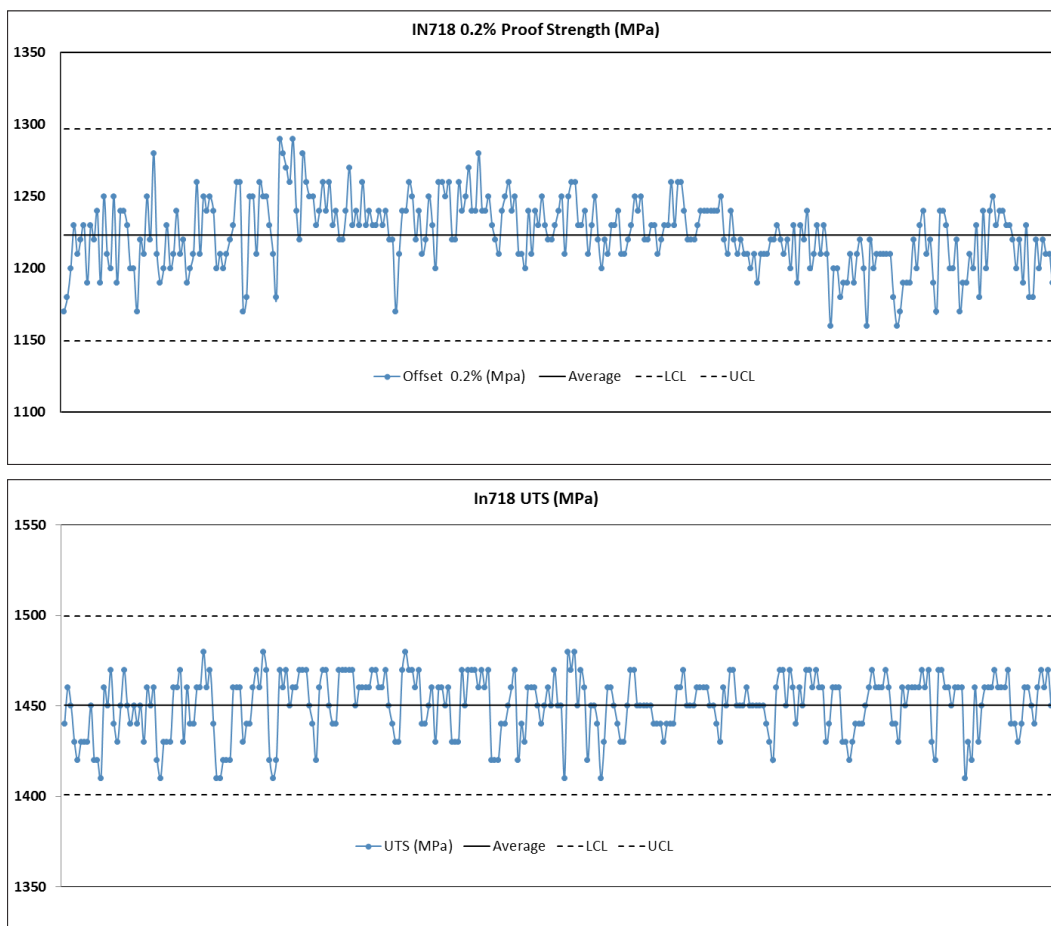
² AMS5662 heat treatment in vacuum furnace as follows: 980°C for 1 hour, quench in Argon. Ramp to 718°C and dwell for 8 hours, furnace cool to 620°C, dwell at 620°C for 8 hours, argon cool. Please contact us for bespoke heat treatment to achieve different mechanical properties. Please contact us for bespoke heat treatment to achieve different mechanical properties.

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Chemical properties

| | | | | | | |
|--------------------------|----|-------------|-------|-----------|----|-----------|
| Material composition wt% | Ni | 50.00-55.00 | Al | 0.20-0.80 | C | 0.08 max |
| | Cr | 17.00-21.00 | Fe | Balance | B | 0.006 max |
| | Co | 1.00 max | Ti | 0.65-1.15 | Cu | 0.30 max |
| | Mo | 2.80-3.30 | Nb+Ta | 4.75-5.50 | Mn | 0.15 max |
| | P | 0.015 max | S | 0.015 max | Si | 0.35 max |

Statistical Process Control Charts³



| Material Properties | Applications | Finishes | Industries |
|--|--|---|--|
| <ul style="list-style-type: none"> Corrosion Resistant High Strength High Temperature Performance | <ul style="list-style-type: none"> Prototyping Engineering Turbomachinery Rocket and space application components Chemical and process industry parts Oil well, petroleum and natural gas industry parts | <ul style="list-style-type: none"> Machined Spark-eroded Welded Micro shot-peened Polished Coated | <ul style="list-style-type: none"> Automotive Aerospace Oil & Gas |

³ Data generated in a production environment through calibration builds, production builds and testing of powders during the goods in procedure. Specimen geometry is ASTM E8M flat with cross section of 2mmx6mm at the gauge section.