



Quick Facts

- Nickel Chromium Molybdenum Niobium alloy
- Extremely high strength, excellent ductility and toughness
- Corrosion resistance equivalent to alloy 625
- Supplied in the solution annealed and age hardened condition
- Commonly referred to as Inconel® 725

Alloy 725 is a nickel-chromium-molybdenum-niobium alloy which gains its high strength through aging. Originally developed for Oil Patch applications such as well head and subsurface completions, it has been used as pressure containing, flow wetted components in subsurface safety valves and other down hole components.

Due to its substantial molybdenum content it can resist a broad range of corrosive environments including sour gas service and marine applications. It is resistant to pitting and crevice corrosion, hydrogen embrittlement and stress corrosion cracking in reducing media, brine, sea water and the effects media containing hydrogen sulphide, chlorides and carbon dioxide. Alloy 725 is approved under NACE MR0175 for use in sour gas wells.

Alloy 725 gains its strength through aging and can be aged to strength levels comparable to 706 and 718.

Typical Applications

Typical applications are hangers, landing nipples, side pocket mandrels, stem and bodies of special and subsea valves, polished bore receptacles in sour gas service, fasteners in marine applications and blades and critical components of steam and gas turbines.

Stock Range

We stock a comprehensive range of round bar sizes between 45mm and 260mm diameter. We can also supply flat bar, rings, blocks and slabs.

Primarily manufactured in Europe and USA



Industry Specifications

- ASTM B805
- UNS N07725

Material may also be supplied to Customer specifications, subject to enquiry

Chemical Analysis

Typical Analysis:

| | C | Mn | Si | P | S | Cr | Ni | Ti | Al | Mo | Nb+Ta | Fe | - |
|-----|------|------|------|-------|-------|------|------|-----|------|-----|-------|-----|---|
| Min | - | - | - | - | - | 19.0 | 55.0 | 1.0 | - | 7.0 | 2.75 | - | % |
| Max | 0.03 | 0.35 | 0.20 | 0.015 | 0.010 | 22.5 | 59.0 | 1.7 | 0.35 | 9.5 | 4.0 | BAL | % |

Material Condition

The majority of our material is supplied in the solution annealed and aged condition. We also supply in the annealed condition if required.

Heat Treatment

Alloy 725 is solution annealed at approx. 1040°C and air cooled, followed by a precipitation hardening treatment to strengthen the alloy. For sour gas applications the recommended aging treatment is 730 °C/ 8 hours/ furnace cooled at 56°C/hour to 620°C /8 hours/air cool.

Machinability

Alloy 725 machinability is comparable to alloy 625 and 718 and can be machined in the annealed or aged conditions. Cemented carbide tools produce the highest cutting rates and are recommend for most turning operations involving uninterrupted cuts. High speed steel tools may be used for interrupted cuts and finishing close to tolerances with the smoothest surfaces and with the least amount of work hardening.



Mechanical Properties

Typical room temperature properties for age hardened 725 between 13mm and 190mm:

| Tensile (PSI (MPA)) | Yield (0.2% offset), (PSI (MPA) Min) | Elongation in 2" or 4D min% | Rockwell Hardness HRC | Charpy Impacts at RT Joules (ftlb) min |
|---------------------|--------------------------------------|-----------------------------|-----------------------|--|
| 180,000 (1241) | 131,000 (903) | 31 | 36 | 132 (97) |

Physical Properties

Typical properties at room temperature in the annealed condition:

| | |
|-------------------|---|
| Melting Range | 1271°C - 1343°C (2320°F - 2449°F) |
| Room Temp Density | 8.31 g/cm ³ |
| Young's Modulus | 204 GPa (29.9 x 10 ³ ksi) |
| Shear Modulus | 78GPa (11.3 x 10 ³ ksi) |
| Poisson's Ratio | 0.31 |

All material we supply has full traceability with inspection certification in accordance with BS EN 10402 3.1. We can supply material with BS EN 10402 3.2 inspection certification on request. We have onsite PCN and SNT Level III inspectors who can test material to your requirements. All information included in this sheet is intended as a guide only and is correct to the best of our knowledge.