

# AMS 5596



O'Neal High-Performance Metals Group

# Alloy 718 Plate

## UNS R07718

0.297 lbs/in<sup>3</sup>, 8.22 g/cm<sup>3</sup>

### Nominal Composition

Nickel 52%, Chromium 19%, Iron 18%, Columbium 5% Molybdenum 3% Titanium 1%

### Description

Alloy 718 is a precipitation-hardening nickel chromium alloy containing significant amounts of iron, columbium, and molybdenum, along with lesser amounts of aluminum and titanium. Alloy 718 maintains high strength and good ductility up to 1300°F (704°C). This alloy has relatively good weldability, formability, and excellent cryogenic properties compared to other precipitation hardening nickel alloys. The sluggish precipitation hardening response of this alloy allows it to be readily welded without hardening or cracking.

### Properties

Non-magnetic. Good corrosion resistance and oxidation resistance in jet engine and gas turbine applications. This alloy is used for parts requiring high resistance to creep and stress rupture up to 1300°F (704°C) and oxidation resistance up to 1800°F (982°C). Alloy 718 exhibits excellent tensile and impact properties even at cryogenic temperatures.

### Hardness

Hardness of Aerodyne stock is typically 225 BHN. Classified as a precipitation-hardening alloy that can be age hardened by heat treatment. Grain structure remains austenitic at all temperatures. Various solution and aging treatments are used during heat treatment of this grade to optimize either short or long time elevated temperature mechanical properties.

### Machinability

RATING: 12% of B-1112

TYPICAL STOCK REMOVAL RATE: 20 surface feet/minute with high-speed tools. 80 surface feet/minute with carbide.

COMMENTS:

Carbide tooling preferred for turning operations, but high speed steel preferred for milling (to avoid tooth chipping). Use relatively heavy cuts and low speeds to minimize surface work hardening. Roughing cuts are usually made before hardening, finishing cuts after hardening. Allow a contraction due to hardening of about 0.001 inch per inch of the workpiece dimensions.

### Weldability

Alloy 718 can be joined to itself and to many other metals using conventional welding processes. These include resistance, inert gas tungsten arc (TIG), gas metal arc welding (GMAW), plasma and electron beam welding. Because of the relatively slow aging reaction rate, welding Alloy 718 does not present postweld cracking problems associated with most other high-temperature precipitation hardening alloys. Alloy 718 can be welded in either the annealed or precipitation hardened condition and may be repair welded without difficulty.

Density: 0.297 lbs/in<sup>3</sup>, 8.22 g/cm<sup>3</sup>

### Standard Inventory Specifications

- AMS 5596
- Predominately produced by VIM-VAR melt method. Hot worked, solution treated (annealed), then descaled.