

## Nickel-based Alloy

# PER706

NiFe38Cr16Nb

### SPECIFICATIONS

UNS : N09706  
AMS : 5703

### COMPOSITION

Carbon.....	< 0.04
Iron.....	37.00
Chromium.....	16.00
Nobium + Tantalum.....	2.90
Titanium.....	1.80
Aluminum.....	0.20
Nickel.....	Base

### TYPICAL MECHANICAL PROPERTIES

On metal supplied ready for use:

- Tensile test at ambient temperature:
  - UTS: 1260 N/mm<sup>2</sup>
  - 0.2 % Yield strength: 1000 N/mm<sup>2</sup>
  - Elongation (5d): 18 %
- Rapid tensile test at temperature:
  - at 200°C:
    - UTS: 1185 N/mm<sup>2</sup>
    - 0.2 % Yield strength: 940 N/mm<sup>2</sup>
  - at 400°C:
    - UTS: 1100 N/mm<sup>2</sup>
    - 0.2 % Yield strength: 890 N/mm<sup>2</sup>
  - at 600°C:
    - UTS: 1015 N/mm<sup>2</sup>
    - 0.2 % Yield strength: 830 N/mm<sup>2</sup>
    - Elongation (5d): 19 %

- Creep:

Temperature in °C	Average load in N/mm <sup>2</sup> causing creep fracture in 1000 hrs
600	800
650	615
700	510

### APPLICATIONS

- Aerospace industry: compressor discs.
- Marine and land-based machines: gas turbines.

### CHARACTERISTICS

Precipitation hardened, nickel-based superalloy with:

- Good resistance to oxidation.
- Good mechanical properties at high temperature up to 650°C.

## HEAT TREATMENT

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- Solution treatment and precipitation heat treatment:  
980°C / Air cool + 720°C / 8 hrs / furnace cool + 620°C / 8 hrs / Air cool.

## PHYSICAL PROPERTIES

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- Density:

- at 20°C:	8.1
- at 400°C:	8.0
- at 800°C:	7.8
- Mean coefficient of expansion in m/m.°C:

- between 20°C and 200°C:	$14.5 \times 10^{-6}$
- between 20°C and 400°C:	$15.5 \times 10^{-6}$
- between 20°C and 600°C:	$16.2 \times 10^{-6}$
- Modulus of elasticity in N/mm<sup>2</sup>:

- at 20°C:	$211 \times 10^3$
- at 200°C:	$200 \times 10^3$
- at 400°C:	$188 \times 10^3$
- at 600°C:	$175 \times 10^3$
- at 800°C:	$160 \times 10^3$
- Thermal conductivity in W.m/m<sup>2</sup>.°C:

- at 20°C:	12.0
- at 200°C:	15.0
- at 400°C:	18.5
- at 600°C:	21.5
- Specific heat in J/g.°C:

- at 20°C:	0.44
- at 200°C:	0.49
- at 400°C:	0.54
- at 600°C:	0.60
- at 800°C:	0.65
- at 1000°C:	0.70

## FORGING

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- 1150/950°C

Contact:

[www.aubertduval.com](http://www.aubertduval.com)

The data provided in this document represent typical or average values rather than maximum or minimum guaranteed values. The applications indicated for the grades described are given as guidance only in order to help the reader in his personal assessment. Please note that these do not constitute a guarantee whether implicit or explicit as to whether the grade selected is suited to specific requirements. Aubert & Duval's liability shall not under any circumstances extend to product selection or to the consequences of that selection.