

## Nickel-based Alloy

# PER5

NiCr19Co18Mo4Ti3Al3

### SPECIFICATION

European Standards:

- NiCr19Co18Mo4Ti3Al3

Air: NCK 19 DAT

UNS: N07500

### TYPICAL MECHANICAL PROPERTIES

On metal supplied ready for use:

- Tensile test at ambient temperature (Treatment 1):
  - UTS: 1310 N/mm<sup>2</sup>
  - 0.2 % Yield strength: 840 N/mm<sup>2</sup>
  - Elongation (5d): 20 %
- Rapid tensile test at temperature (Treatment 1):

Temperature in °C	UTS in (N/mm <sup>2</sup> )	0.2 % Yield strength in (N/mm <sup>2</sup> )	Elongation (5d) in %
200	1300	820	-
400	1270	810	-
600	1230	770	28
800	910	680	35
1000	250	180	23

- Tensile test at ambient temperature (Treatment 2):
  - UTS: 1200 N/mm<sup>2</sup>
  - 0.2 % Yield strength: 750 N/mm<sup>2</sup>
  - Elongation (5d): 35 %
- Creep (Treatment 1):

Temperature in °C	Average load in N/mm <sup>2</sup> causing 1% creep elongation in 1000 hrs	Average load in N/mm <sup>2</sup> causing creep fracture in 1000 hrs
650	620	800
700	475	550
750	310	345
800	220	250
900	93	110

### COMPOSITION

Carbon.....	0.08
Colbalt.....	18.50
Chromium.....	18.00
Molybdenum.....	4.00
Aluminum.....	3.00
Titanium.....	3.00
Iron.....	<1.00
Nickel.....	Base

### APPLICATIONS

- Parts Aerospace industry: turbine parts
- Marine and land-based machines: gas turbine blades

### CHARACTERISTICS

Precipitation hardened, nickel-based superalloy with:

- Excellent resistance to oxydation and corrosion
- Very good mechanical properties up to 1000°C

## HEAT TREATMENT

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- Treatment 1:  
1100°C / 2 hrs / Air cool + 850°C / 24 hrs / Air cool + 760°C / 16 hrs / Air cool.
- Treatment 1:  
1175°C / 2 hrs / Air cool + 1080°C / 4 hrs / Air cool + 850°C / 24 hrs / Air cool + 760°C / 16 hrs / Air cool

## PHYSICAL PROPERTIES

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- Density:

- at 20°C:	8.00
- at 400°C:	7.95
- at 800°C:	7.75
- Mean coefficient of expansion in m/m.°C:

- between 20°C and 200°C:	$11.7 \times 10^{-6}$
- between 20°C and 400°C:	$12.3 \times 10^{-6}$
- between 20°C and 600°C:	$14.3 \times 10^{-6}$
- between 20°C and 800°C:	$15.3 \times 10^{-6}$
- Modulus of elasticity in N/mm<sup>2</sup>:

- at 20°C:	$220 \times 10^3$
- at 200°C:	$211 \times 10^3$
- at 400°C:	$199 \times 10^3$
- at 600°C:	$184 \times 10^3$
- at 800°C:	$170 \times 10^3$
- Thermal conductivity in W.m/m<sup>2</sup>.°C:

- at 20°C:	11.0
- at 200°C:	13.0
- at 400°C:	16.2
- at 600°C:	19.2
- at 800°C:	23.0

## FORGING

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- 1200/1000°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.