

Nickel-based Alloy

PYRAD49D

NiCr21Fe18Mo9

SPECIFICATIONS

European standards:
- NiCr21Fe18Mo9

AIR : NC 22 FeD
 WL : 2.4665
 UNS : N06002
 BS : HR6, HR 204

COMPOSITION

Carbon.....	0.09
Chromium.....	22.00
Iron.....	18.50
Molybdenum.....	9.00
Cobalt.....	1.50
Manganese.....	≤ 1.00
Silicon.....	≤ 1.00
Nickel.....	Base

TYPICAL MECHANICAL PROPERTIES

On metal supplied ready for use:

- Tensile test at ambient temperature:
 - UTS: 790 N/mm²
 - 0.2 % Yield strength: 390 N/mm²
 - Elongation (5d): 54 %

- Rapid tensile test at temperature:

Temperature in °C	UTS in (N/mm ²)	0.2 % Yield strength in (N/mm ²)	Elongation (5d) in %
200	730	340	-
400	700	310	-
500	650	300	42
600	600	290	39
700	530	270	38
800	400	250	41

- Creep:

Temperature in °C	Average load in N/mm ² causing creep fracture in 1000 hrs
650	230
700	190
800	70
900	35

APPLICATIONS

- Sheet fabrications for jet engines.
- Guide vanes for jet engines.
- Injection nozzles and cones.
- Hot gas manifolds.
- Combustion chamber components.
- Sheet fabrications and hearths for furnaces operating continuously at 1100°C.

CHARACTERISTICS

Precipitation hardened, nickel-based superalloy with:

- Very good resistance to oxidation.
- Very good mechanical properties at high temperatures.

HEAT TREATMENT

- Solution treatment:
1100-1180°C / 30 min / Air cool

PHYSICAL PROPERTIES

- Density:
 - at 20°C: 8.2
 - at 400°C: 8.1
 - at 600°C: 7.9
- Mean coefficient of expansion in m/m.°C:
 - between 20°C and 200°C: 14.2×10^{-6}
 - between 20°C and 400°C: 14.7×10^{-6}
 - between 20°C and 600°C: 15.3×10^{-6}
 - between 20°C and 800°C: 16.0×10^{-6}
- Modulus of elasticity in N/mm²:
 - at 20°C: 165×10^3
 - at 200°C: 164×10^3
 - at 400°C: 149×10^3
 - at 600°C: 152×10^3
 - at 800°C: 142×10^3
- Thermal conductivity in W.m/m².°C:
 - at 20°C: 9
 - at 200°C: 13
 - at 400°C: 16
 - at 600°C: 20
 - at 800°C: 24
 - at 1000°C: 28
- Specific heat in J/g.°C:
 - at 20°C: 0.48
 - at 200°C: 0.49
 - at 400°C: 0.53
 - at 600°C: 0.61
 - at 800°C: 0.69
 - at 1000°C: 0.77

FORGING

- 1180/1050°C

Contact:

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.