Ualloy600 (Alloy 600)

Nickel alloy 600 ,also known as Inconel 600, UNS N06600, W.Nr.2.4816, is nickel based heat resistant super-alloy(HRSA) widely applicated for its resistance and heat from cryogenic to 700°C(1292°F).

Item	Calling
Alloy Type	Nickel-Chromium-Iron Alloy
ASTM	Inconel 600
UNS NO.	N06600
Germany W-Nr.	WS 2.4816
French ANFOR	NC15FE
Japanese JIS	NCF1B
Korean KS	NCF600
British	NA14
DIN	NiCr15Fe8
Other Calling	1Cr15Ni75Fe8

Web: Ualloy.com
Tel: 86-0571-63255636
Fax: 86-0571-63256181
E: sales@ualloy.com

Information presentation property of Ualloy

Specification	AMS 5665 Bar and Forgings ASTM B166 Rod, Bar and Wire ASME B166 Rod, Bar and Wire

Inconel Alloy 600 Chemical Composition

Element	Content %
C	≤0.15
Cr	14.0-17.0
Ni+Co	≥72
Al	≤0.35
Ti	≤0.50
Fe	6.00-10.00
Nb+Ta	≤1.00
Mn	≤1.00
Si	≤0.50
P	≤0.040
S	≤0.015
Cu	≤0.50

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Physical Constants

Density	8.47g/cm3
Melting Point	1370-1430°C(2498-2606°F)

Is Inconel Alloy 600 Magnetic?

Non-magnetic.

Inconel Alloy 600 Mechanical Property

Round Rods and Bars Cold worked(as worked)

Size Under 1/2 in (12.7mm)

Property	Value	
Tensile Strength, min	120000 psi	825 MPa
Yield Strength(0.2% offset), min	90000 psi	620 MPa
Elongation in 2in. or 50mm or 4D, min	7	

Size from 1/2 to 1 , incl (12.7 to 25.4mm)

Property	Value	
Tensile Strength, min	110000 psi	760 Mpa
Yield Strength(0.2% offset), min	85000 psi	585 Mpa
Elongation in 2in. or 50mm or 4D, min	10	

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Size Over 1 to 21/2 , incl (25.4 to 63.5)

Property	Value	
Tensile Strength, min	105000 psi	725 Mpa
Yield Strength(0.2% offset), min	80000 psi	550 Mpa
Elongation in 2in. or 50mm or 4D, min	12	

Round Rods and Bars Hot worked(as worked)

Size from 1/4 to 1/2 , incl (6.4 to 12.7mm)

Property	Value	
Tensile Strength, min	95,000 psi	655 MPa
Yield Strength(0.2% offset), min	45,000 psi	310 MPa
Elongation in 2in. or 50mm or 4D, min	20	

Size Over 1/2 to 3, incl (12.7-76.2mm)

Property	Value	
Tensile Strength, min	90,000 psi	620 MPa
Yield Strength(0.2% offset), min	40,000 psi	275 MPa
Elongation in 2in. or 50mm or 4D, min	25	

Size over 3 (76.2mm)

Property	Value

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Tensile Strength, min	85,000 psi	585MPa
Yield Strength(0.2% offset), min	35,000 psi	240MPa
Elongation in 2in. or 50mm or 4D, min	30	

Round Rods and Bars Cold-worked(annealed) or hot-worked(annealed), all sizes

Property	Value	
Tensile Strength, min	80,000 psi	550 MPa
Yield Strength(0.2% offset), min	35,000 psi	240 MPa
Elongation in 2in. or 50mm or 4D, min	30	

Heat Treatment

Typical annealing at 1010°C(1850°F) for 15 minutes.
Common Solution: 1090-1150°C (1994-2102°F)to dissolve carbides.

Inconel Alloy 600 Thermal Conductivity

θ/°C	W/(m·°C)
20	12.85
100	13.94
200	15.15
300	16.62
400	18.71

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500	20.72
600	22.40
700	24.49
800	27.00
900	29.51
1000	31.60

Inconel Alloy 600 Thermal Expansion Coefficient

θ/°C	α
20-200	12.35
20-300	12.75
20-400	13.10
20-500	13.55
20-600	14.50
20-700	15.15
20-800	15.70
20-1000	16.20

Inconel 600 Electrical Conductivity

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Temperature °C	Electrical Resistivity μΩ.m
20	1.03
100	1.04
200	1.05
300	1.07
400	1.09
500	1.12
600	1.13
700	1.13
800	1.13
900	1.15

Inconel 600 Oxidation

θ/°C	Oxidation Rate/(g/m^2.h)
800	0.01865
900	0.05724
1000	0.13718

Inconel 600 Elastic Modulus

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θ/°C	En/Gpa
100	205
200	201
300	195
400	189
500	182
600	174
700	164
800	155
900	144
1000	132

Inconel 600 Young Modulus

Temperature °C	Young Modulus GPa
22	214
100	210
200	205
300	199
400	193
500	187

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600	180
700	172
800	164
900	154
1000	143

Inconel Alloy 600 Corrosion resistance

The high nickel content helps to stabilize the FCC structure, dissolve other elements, and gives alloy 600 resistance to stress corrosion cracking from dry chloride or hydrochloric acid.
Cr helps it obtain oxidation resistance at high temperatures and corrosion resistance generated from sulfur or other compounds.
Alloy 600 hold its corrosion resistance in flowing seawater, corrosive environments containing sulfuric acid and hydrochloric acid at room temperature.

Microstructure

Inconel alloy 600 is a stable austenitic solid-solution alloy.

Inconel 600 Fatigue

Condition	Fatigue Strength(10^8 Cycles)	
Annealed	39.0 ksi	268.9 Mpa
Hot-rolled	40.5 ksi	279.2 MPa

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Inconel 600 Machining

The cutting tools for Inconel 600 shall be very sharp with adequate strength.
Cutting speed: 30-40 smm, 100-120 sfm,
Cutting feed: 0.009-0.01 feed multiplier
Rake angle: 3°-10°, clearance angle: 8-15°

Is Inconel 600 included in NACE MR0175?

No.

Application:

High Temperature Oxidative Environment

-Presssure Vessels

Inconel 600 is covered by ASME boiler and pressure vessel code Section Ⅰ ,II, III for temperature up to 650°C.

-Exhaust liners

-Turbine seals, bolts, fasteners, gaskets, flanges

-Thermal reactors in exhaust systems of gasoline engines

-Combustion-can liners

-Containment rings

- Jet-engine igniters

Corrosive Environment

-Condensers for processing of fatty acids

- Catalyst grid supports in equipment for nitric acid production

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Inconel is a trademark of high-performance nickel-based alloys developed by Special Metals Corporation.

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