NIMARK® 300

Applicable specifications: AMS 6514, MIL-S-46850

Alternative designations: UNS K93120

Type analysis

Single figures are nominal except where noted.

Iron	Balance	**Nickel**	18.50 %	**Cobalt**	8.75 %
Molybdenum	4.90 %	**Titanium**	0.65 %	**Aluminum**	0.10 %
Manganese	Max 0.10 %	**Silicon**	Max 0.10 %	**Calcium**	Max 0.05 %
Carbon	Max 0.03 %	**Zirconium**	Max 0.03 %	**Phosphorus**	Max 0.010%
Sulfur	Max 0.010%	**Boron**	Max 0.003 %		

Forms manufactured

Bar-Rounds	**Billet**	**Strip**	**Weld Wire**	**Wire**

Description

NiMark 300 is a low-carbon, nickel-cobalt-molybdenum high-temperature alloy capable of attaining yield strengths in excess of 270 ksi (1862 MPa) through simple, low-temperature heat treatment at 900°F (482°C). It exhibits good ductility at high strength levels, excellent notch ductility, and is readily welded.

NiMark 300 is one of a family of "maraging" nickel steels which is martensitic yet ductile in the solution treated condition and attains ultrahigh strength through a single low-temperature aging treatment.

Key Properties:

- High core strength
- High surface fatigue
- High temperature resistance

Markets:

- Aerospace
- Transportation

Applications:

- Landing gear
- Other high-strength structural applications

info@cartech.com | 610 208 2000

> NIMARK 300

Corrosion resistance

IMPORTANT NOTE:
The following 4-level rating scale is intended for comparative purposes only. Corrosion testing is recommended; factors which affect corrosion resistance include temperature, concentration, pH, impurities, aeration, velocity, crevices, deposits, metallurgical condition, stress, surface finish, and dissimilar metal contact.

Humidity	Restricted

Physical properties

SPECIFIC GRAVITY	8.00
DENSITY	0.2890 lb/in^3
MEAN CTE (75 TO 900°F)	5.60 x 10^{-6} in/in/°F
ELECTRICAL RESISTIVITY (70°F)	232.0 ohm-cir-mil/ft

Typical mechanical properties

LONGITUDINAL CHARPY V-NOTCH IMPACT PROPERTIES

TEST TEMPERATURE		IMPACT ENERGY	
°F	**°C**	**ft-lb**	**J**
100	38	20	27
0	-18	18	24
-100	-73	16	22
-200	-129	13	18

TYPICAL ELEVATED TEMPERATURE TENSILE STRENGTH

TEST TEMPERATURE		TENSILE STRENGTH	
°F	**°C**	**ksi**	**MPa**
800	427	240	1655
900	482	210	1448
1000	538	168	1158

> NIMARK 300

Typical room temperature mechanical properties

BARS UNDER 4 IN. (102 MM) DIAMETER

TENSILE STRENGTH		YIELD STRENGTH		REDUCTION OF AREA	ELONGATION	HARDNESS
ksi	MPa	ksi	MPa	%	% IN 4D	ROCKWELL C
294	2027	290	1999	58	11	52

Treated 1500°F (816°C) 30 min., air cooled and aged 900°F (482°C) 3 hours, air cooled.

NOTCHED TENSILE STRENGTH TO UNNOTCHED TENSILE STREGTH		1
FATIGUE LIFE — ENDURANCE LIMIT	ksi	125
	MPa	862
FRACTURE TOUGHNESS (APPROX.)	ksi√in.	70
TRANSVERSE STRENGTH		Similar to longitudinal values while ductility is typically 80% of longitudinal values

LARGE-SECTION SIZES

SECTION SIZE		DIRECTION OF TEST	YIELD STRENGTH		ULTIMATE TENSILE STRENGTH		ELONGATION	REDUCTION OF AREA	HARDNESS
in^2	mm^2		ksi	MPa	ksi	MPa	%	%	ROCKWELL C
12	7742	Transverse	278	1917	287	1979	7.0	28	53
		Longitudinal	281	1937	289	1993	8.0	38	53
9	5806	Transverse	277	1910	288	1986	7.0	28	53
		Longitudinal	280	1931	289	1993	8.0	39	53
6	3871	Transverse	278	1917	287	1979	7.0	29	53
		Longitudinal	277	1910	287	1979	8.0	39	53
4	2581	Transverse	275	1896	280	1931	10.0	56	52
		Longitudinal	285	1965	289	1993	11.0	58	52

Treated 1500°F (816°C) 30 min., air cooled and aged 900°F (482°C) 3 hours, air cooled.

> NIMARK 300

HOT HARDNESS		
TEST TEMPERATURE		HARDNESS
°F	°C	BHN
800	427	495
900	482	450
1000	538	400
1100	593	300
1200	649	190
1300	704	160

Heat treatment

Annealing	Annealing and solution treating are performed simultaneously by heating to 1500°F ±50°F (816°C ±10.1°C) for a minimum of 30 minutes at temperature, followed by air cooling to room temperature.
Age	Usually NiMark 300 is aged at 900°F (482°C) for a minimum of 3 hours followed by air cooling.

Workability

Machinability	NiMark 300 is readily machined in the solution treated (annealed) condition. Limited machining can be performed in the fully treated condition. Annealed hardness is typically 32 Rc.
Weldability	NiMark 300 can be welded using conventional welding methods and electrodes of approximately the same composition as the base material. Preheating is not required.

For additional information, please contact your nearest sales office:
info@cartech.com | 610 208 2000