

MONEL ALLOY 400:

MONEL nickel-copper alloy 400 (UNS N04400/W.Nr. 2.4360 and 2.4361) is a solid-solution alloy that can be hardened only by cold working.

It has high strength and toughness over a wide temperature range and excellent resistance to many corrosive environments .

Alloy 400 is widely used in many fields, especially marine and chemical processing. Typical applications are valves and pumps; pump and propeller shafts; marine fixtures and fasteners; electrical and electronic components; springs; chemical processing equipment; gasoline and fresh water tanks; crude petroleum stills, process vessels and piping; boiler feedwater heaters and other heat exchangers; and deaerating heaters.

Chemical properties (Limiting Chemical Composition%)

Ni	C	Mn	Fe	S	Si	Cu
63.0 min.	0.3 max.	2.0 max.	2.5 max.	0.024 max.	0.5 max.	28.0 - 34.0

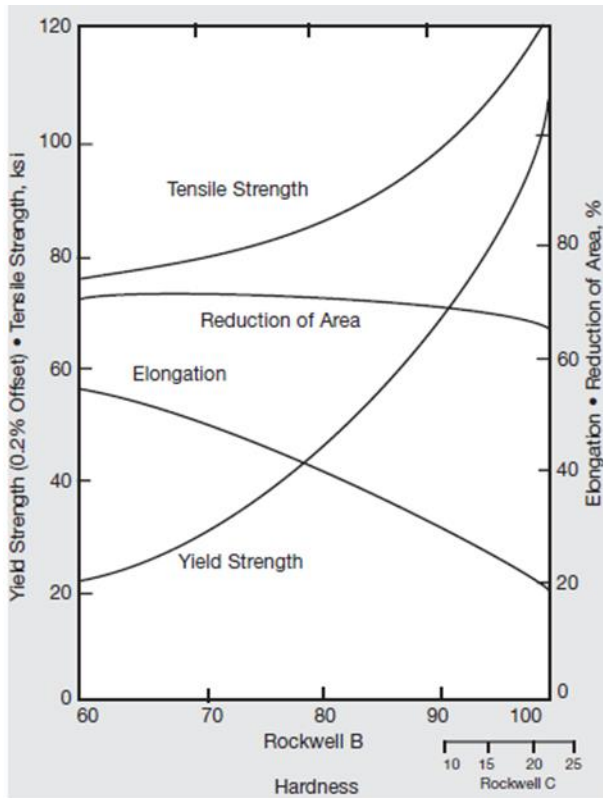
Physical properties

Density		Melting Range		Modulus of Elasticity, 103 ksi			Poisson 's Ratio	Curie Temperature	
g/cm³	lb/in³	°F	°C	Tension	Compression	Torsion		°F	°C
8.80	0.318	2370 - 2460	1300 - 1350	26.0	26.0	9.5	0.32	70-120	21-49

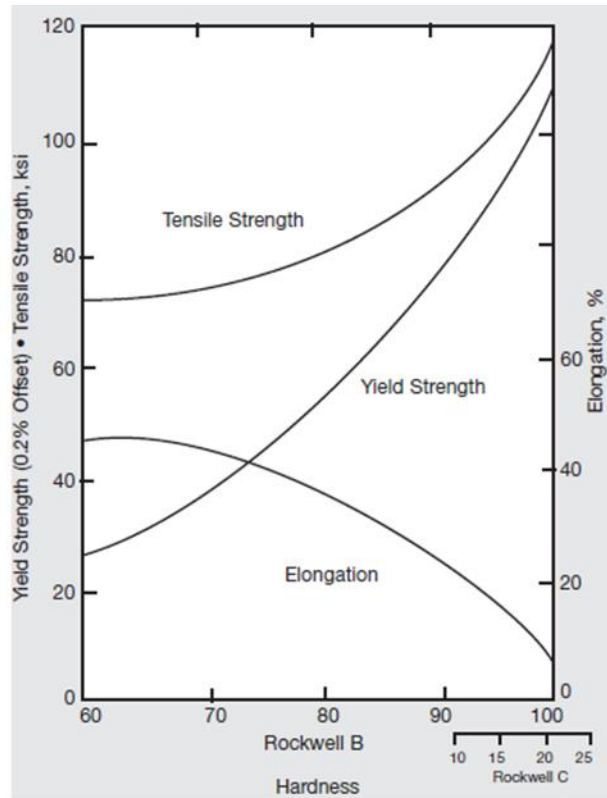
Mechanical properties

Form and Condition	Tensile Strength		Yield Strength (0.2% Offset)		Elongation, %	Hardness	
	ksi	MPa	ksi	MPa		Brinell (3000-kg)	Rockwell B
Rod and Bar							
Annealed	75-90	517-620	25-50	172-345	60-35	110-149	60-80
Hot-Finished (except Hexagons over 2 1/8 inches and Angles)	80-110	552-758	40-100	276-690	60-30	140-241	75-100
Hot-Finished Hexagons over 2 1/8 inches and Angles	75-100	517-690	30-55	207-379	50-30	130-184	72-90
Cold-Drawn, Stress-Relieved	84-120	579-827	55-100	379-690	40-22	160-225	85-20C
Plate							
Hot-Rolled, As-Rolled	75-95	517-655	40-75	276-517	45-30	125-215	70-96
Hot-Rolled, Annealed	70-85	482-586	28-50	193-345	50-35	110-140	60-76
Sheet							
Annealed	70-85	482-586	30-45	207-310	45-35	-	65-80
Cold-Rolled, Hard	100-120	690-827	90-110	621-758	15-2	-	93 min. ^a
Strip, Cold-Rolled							
Annealed	70-85	482-586	25-45	172-310	55-35	-	68 max. ^a
Spring Temper	100-140	690-965	90-130	621-896	15-2	-	98 min. ^a
Tube and Pipe, Seamless							
Cold-Drawn, Annealed	70-85	482-586	25-45	172-310	50-35	-	75 max. ^a
Cold-Drawn, Stress-Relieved	85-120	586-827	55-100	379-690	35-15	-	85-100 ^a
Heat-Exchanger, Annealed	70-85	482-586	28-45	193-310	50-35	-	75 max. ^a
Heat-Exchanger, Stress-Relieved	85-105	586-724	55-90	379-621	35-15	-	85-97 ^a
Hot-Extruded	_b	_b	_b	_b	_b	-	_b
No. 1 Temper (Annealed)	85 max.	586 max.	30-45	207-310	45-30	-	73 max. ^a
No. 2 Temper (Half-Hard)	85-105	586-724	55-80	379-552	30-10	-	75-97 ^a
No. 3 Temper (Full-Hard)	110-130	758-896	90-110	621-758	10-3	-	95-27C
Wire, Cold Drawn^c							
Annealed	70-95	482-655	30-55	207-379	45-25	-	-
No. 1 Temper	85-100	586-690	50-75	345-517	30-20	-	-
Quarter-Hard	95-120	655-827	65-95	448-655	25-15	-	-
Half-Hard	110-135	758-931	85-120	586-827	15-8	-	-
Three-Quarter-Hard	125-150	862-1034	100-135	690-931	8-5	-	-
Full-Hard--Spring Temper	145-180	1000-1241	125-170	862-1172	5-2	-	-

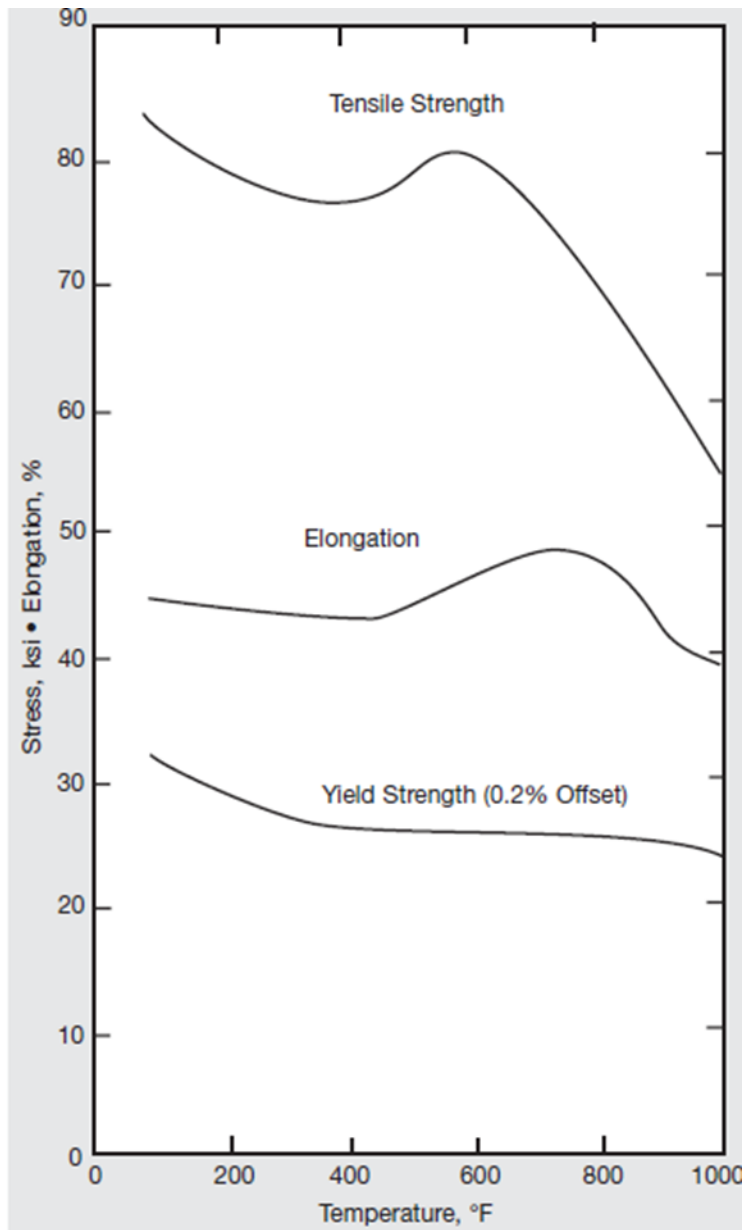
Mechanical properties diagram



Approximate relationships between tensile properties and hardness of hot-rolled and cold-drawn MONEL alloy 400 rods and forgings.



Approximate relationships between tensile properties and hardness of MONEL alloy 400 sheet and strip.



High-temperature properties of annealed MONEL alloy 400.