



Castle Metals®

Nickel Alloys

Quik Guide

Your Foremost Provider of Specialty Products, Services and Solutions





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ALLOY	DESCRIPTION	MAJOR APPLICATIONS ⁽⁴⁾	NOMINAL CHEMICAL COMPOSITIONS (% BY WEIGHT)					
			Ni	Cr	Mo	Fe	Cu	Other
Nickel 200⁽²⁾	Commercially pure wrought nickel, good mechanical properties and excellent resistance to many corrosives.	Food processing equipment, marine and offshore engineering, salt production, caustic handling equipment and piping.	99.6	—	—	—	—	C 0.04
MONEL^{®(1)}	alloy 400	A Ni-Cu alloy with high strength and excellent corrosion resistance to a wide range of media.	65.1	—	—	1.6	32.0	Mn 1.1
	alloy R-405	Similar to alloy 400. Controlled sulfur added for improved machining characteristics.	65.0	—	—	1.2	32.5	Mn 1.1 S 0.04
	alloy K-500	Age-hardenable version of alloy 400 for increased strength and hardness.	64.7	—	—	1.0	30.2	Al 2.7 Ti 0.6
INCONEL^{®(1)}	alloy 600	A Ni-Cr-Fe alloy with good resistance to oxidizing and reducing environments; for severely corrosive environments at elevated temperatures.	76.0	15.0	—	8.0	—	—
	alloy 601	Excellent high temperature properties, resistance to oxidizing, carburizing, and sulfur-containing atmospheres.	60.5	23.0	—	14.4	—	Al 1.4
	alloy 617	Optimum high-temperature mechanical stability, oxidation and corrosion resistance. Excellent cyclic oxidation and carburization resistance at 2000° F. Good stress-rupture properties above 1800° F.	52.0	22.0	9.5	1.5	—	Co 12.5 Al 1.2
	alloy 622	Excellent resistance to general corrosion, pitting, crevice corrosion, intergranular attack and stress-corrosion cracking in aggressive chemical environments.	59.0	20.5	14.2	2.3	—	W 3.2
	alloy 625⁽³⁾	A Ni-Cr-Mo alloy with high strength and toughness from cryogenic temperatures to 1500°F. Good oxidation resistance, exceptional fatigue strength and good resistance to many corrosives.	61.0	21.5	9.0	2.5	—	Nb 3.6
	alloy C-276	Excellent resistance to pitting and stress-corrosion cracking. Superior resistance to corrosion in flue gas desulfurization environments containing chlorides.	57.0	16.0	16.0	5.5	—	W 4.0
	alloy 718	An age hardenable alloy which offers a combination of high strength up to 1300°F, corrosion-resistance and good weldability.	54.0	18.0	3.0	18.5	—	Nb 5.0 Ti 1.0
	alloy 725TM	An alloy with corrosion-resistance comparable to alloy 625 but with higher strength obtainable through age-hardening.	57.0	21.0	8.0	7.5	—	Nb 3.5 Ti 1.5 Al 0.3
	alloy X-750	An age-hardenable Ni-Cr-Fe alloy with high tensile and creep-rupture properties up to 1300°F.	73.0	15.5	—	7.0	—	Ti 2.5 Nb 1.0 Al 0.7
	alloy HX	An alloy which offers excellent strength, fabrication and oxidation-resistance at temperatures up to 2000°F.	47.0	22.0	9.0	18.0	—	Co 1.5 W 0.6 C 0.1
	INCOLOY^{®(1)}	alloy 800	Strong and resistant to oxidation and carburization at elevated temperatures. Resists sulfur attack, internal oxidation, scaling, and corrosion in a wide variety of atmospheres.	32.5	21.0	—	46.0	—
alloy 800HT[®]		Similar to alloy 800 with better high-temperature strength. Higher design strength values for applications above 1150°F. Improved creep and stress-rupture properties in the 1100°F to 1800°F temperature range.	32.5	21.0	—	46.0	—	Al + Ti 0.85-1.2 C 0.08
alloy 20		Offers excellent resistance to general corrosion, pitting and crevice corrosion in media containing chlorides and sulfuric, phosphoric and nitric acids.	35.0	20.0	2.5	37.0	3.5	Nb 0.6
alloy 825		Excellent resistance to a wide variety of corrosives. Resists pitting and intergranular type corrosion, reducing acids and oxidizing chemicals.	42.0	21.5	3.0	28.0	2.0	—
alloy 925TM		An alloy with corrosion-resistance similar to alloy 825 but with higher strength obtained through age-hardening.	44.0	21.0	3.0	28.0	1.8	Ti 2.1 Al 0.3

(1) Castle Metals is proud to be a distributor of the MONEL[®], INCONEL[®] and INCOLOY[®] registered trademarks of Special Metals Corporation, a PCC Company.
 (2) Nickel 201, low carbon version suggested for temperatures above 600° F.
 (3) Alloy 625 LCF, chemical and process control for optimum resistance to mechanical and thermal fatigue to 1200° F.

(4) This column is provided for your convenience. A. M. Castle & Co. cannot and does not make recommendations of type or grade of material for end use.
 (5) Many variables influence the performance of nickel alloys in a specific environment. A. M. Castle & Co. cannot and does not make recommendations for end use.
 (6) Typical data, not suited for design or specifications.

(7) Stress-relieved.
 (8) Age-hardened.
 (9) Inventory may not meet all typical specifications. Check with stocking district for inventory specifications.
 (10) Alloys 718 and 925 bar available for the oil and gas industry to NACE MR0175 and API 6A.

CORROSION RESISTANCE ⁽⁵⁾											HIGH TEMP. ⁽⁵⁾ RESISTANCE (+ 1000° F)			MECHANICAL PROPERTIES ⁽⁶⁾				SPECIFICATIONS ⁽⁹⁾		
Sulfuric Acid	Hydrochloric Acid	Hydrofluoric Acid	Phosphoric Acid	Nitric Acid	Organic Acid	Alkalies	Salts	Seawater	Chloride Cracking	Oxidation	Carburization	High Temperature Strength & Stability	Density lb/in ³	Nominal Room-Temperature Mechanical Properties (Annealed material unless otherwise noted)				ASTM(B) ASME(SB)	SAE AMS	UNS
														Tensile Strength ksi	0.2% Yield Strength ksi	Elongation %	Hardness Brinell			
●	●	●	●	○	●	●	●	●	●	○	○	○	0.321	65	30	45	110	160 161 162		N02200
●	●	●	●	○	●	●	●	●	●	○	○	○	0.318	80	40	45	140	127 164 165	4544 4675	N04400
●	●	●	●	○	●	●	●	●	●	○	○	○	0.318	95 ⁽⁷⁾	85 ⁽⁷⁾	25 ⁽⁷⁾	205 ⁽⁷⁾	164	4674	N04405
●	●	●	●	○	●	●	●	●	●	○	○	○	0.305	155 ⁽⁸⁾	100 ⁽⁸⁾	25 ⁽⁸⁾	310 ⁽⁸⁾	586	4676	N05500
●	○	●	●	○	●	●	●	●	●	●	●	●	0.306	100	50	40	170	166 168 564	5540 5665	N06600
●	○	●	●	●	●	●	●	●	●	●	●	●	0.293	95	40	50	145	166 168	5715 5870	N06601
●	●	●	●	●	●	●	●	●	●	●	●	●	0.302	115	55	50	185	166 168	5887 5888 5889	N06617
●	●	●	●	●	●	●	●	●	●	●	●	●	0.311	115	55	60	170	574 575		N06022
●	●	●	●	●	●	●	●	●	●	●	●	●	0.305	125	65	50	200	443 446	5599 5666 5879	N06625
●	●	●	●	●	●	●	●	●	●	●	●	●	0.321	110	50	60	180	574 575		N10276
●	●	●	●	●	●	●	●	●	●	●	●	●	0.296	205 ⁽⁸⁾	165 ⁽⁸⁾	20 ⁽⁸⁾	425 ⁽⁸⁾	637 670	5596, 5663 5597, 5664, 5662	N07718 ⁽¹⁰⁾
●	●	●	●	●	●	●	●	●	●	●	●	●	0.300	185 ⁽⁸⁾	130 ⁽⁸⁾	30 ⁽⁸⁾	355 ⁽⁸⁾	805		N07725
●	○	○	●	○	●	●	●	●	●	●	●	●	0.299	180 ⁽⁸⁾	120 ⁽⁸⁾	15 ⁽⁸⁾	325 ⁽⁸⁾	637	5542, 5670 5667, 5671 5668, 5747 5669,	N07750
●	●	●	●	○	●	○	●	●	●	●	●	●	0.297	110	50	50	170	435 572	5536 5754	N06002
●	●	○	●	●	●	●	●	●	●	●	●	●	0.287	90	50	40	165	408 409	5871 5766	N08800
●	●	○	●	●	●	●	●	●	●	●	●	●	0.287	80	35	45	145	408 409 564		N08811
●	●	●	●	●	●	●	●	●	●	○	○	○	0.292	95	60	35	180	463 472 473		N08020
●	●	●	●	●	●	●	●	●	●	●	●	●	0.294	95	45	45	155	424 425		N08825
●	●	●	●	●	●	●	●	●	●	●	●	●	0.292	170 ⁽⁸⁾	120 ⁽⁸⁾	25 ⁽⁸⁾	320 ⁽⁸⁾			N09925 ⁽¹⁰⁾

● Good to Excellent ● Acceptable ○ Not Suitable

The information in this quick guide is correct to the best of our knowledge. A. M. Castle & Co. assumes no responsibility for errors or omissions. A. M. Castle & Co. publishes this quick guide for guidance of their customers and reserves the right to add or delete items without notice.

Standard Inventory Size Ranges*

Alloys	Bar		Sheet	
			36" & 48" Widths	
	Round	Hex	Flat	Coiled
200	1/8" - 3"	—	.018" - .125"	—
400	1/4" - 10 1/2"	—	.018" - .140"	—
R-405	1/8" - 3 1/2"	1/2" - 3"	—	—
K-500	1/4" - 9"	—	—	—
600	1/8" - 6"	—	.018" - .140"	—
601	1/4" - 2"	—	.031" - .140"	—
617	—	—	.020" - .187"	.020" - .125"
625	1/2" - 12"	—	.016" - .250"	.020" - .125"
625LCF	—	—	.018" - .078"	.020" - .125"
C-276	1/2" - 8"	—	.025" - .125"	—
718 AMS	1/4" - 7"	—	.016" - .250"	.020" - .125"
718 NACE	3/4" - 12"	—	—	—
X-750	1/8" - 3 3/4"	—	.031" - .125"	.031" - .125"
HX	5/16" - 7"	—	.018" - .187"	.020" - .125"
800HT	1/2" - 6"	—	.031" - .125"	—
20	1/2" - 8"	—	—	—
825	5/8" - 2"	—	.031" - .125"	—
925	1/2" - 11"	—	—	—

*Other sizes available on request.

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