



Alloy Properties

Metallurgical guidelines from Barron Industries

Alloy Grade

Choice of alloy listed from least to greatest cost.

Plain Carbon and Low Alloy Steels

8620, 4130, 4140, WCB, and 1035 are best choices due to high volume.

400 Series Stainless Steel

CA-15 (410), 440C are best choices. Specify CF-16F (303) if necessary for machinability.

300 Series Stainless Steel

CF-8M (316), CF-3M (316L), CF-8 (304) are best choices. Specify CF-16F (303) if necessary for machinability.

17-4PH

Blend of corrosion resistance and strength.

Tool Steels

Costs vary widely depending on grade. A2, S7, D2 are commonly poured.

Copper Base Alloys

Silicon Bronze, Red Brass, Copper Nickel 90/10 for best seawater corrosion resistance.

Monel

Choose based on end use.

Nickel Base

Alloy CW2M is good choice for corrosion resistance.

Cobalt Base

All grades pour well—choice is based on end use and cost.

LEAST EXPENSIVE
!
MOST EXPENSIVE

Carbon, and Low Alloy Steels

Alloy	Condition	Tensile Strength (psi)	0.2% Yield Strength (psi)	% Elongation Range	Hardness Range or Max
IC 1010	Annealed	50-60,000	30-35,000	30-35	50-55 Rb
IC 1020	Annealed	60-70,000	40-45,000	25-40	80 Rb
IC 1025	Annealed	63-73,000	42-47,000	25-35	80 Rb
WCB	Normalized	70-95,000	36-42,000	22-30	78-93 Rb
IC 1030	Annealed Hardened	65-75,000 85-150,000	45-50,000 60-150,000	20-30 0-15	75 Rb 20-50 Rc
IC 1035	Annealed Hardened	70-80,000 90-150,000	45-55,000 85-150,000	20-30 0-15	80 Rb 25-52 Rc
IC 1045	Annealed Hardened	80-90,000 100-180,000	50-60,000 90-180,000	20-25 0-10	100 Rb 25-57 Rc
IC 1050	Annealed Hardened	90-110,000 125-180,000	50-65,000 100-180,000	20-25 0-10	100 Rb 30-60 Rc
IC 1060	Annealed Hardened	100-120,000 120-200,000	55-70,000 100-180,000	12-20 0-5	25 Rc 30-60 Rc
IC 4130	Annealed Hardened	70-90 130-170,000	50-70 100-130,000	15-25 5-20	100 Rb 23-49 Rc
IC 4140	Annealed Hardened	80-100 130-200,000	50-70 100-155,000	14-24 5-20	100 Rb 29-57 Rc
IC 4150	Annealed Hardened	— 140-200,000	— 120-180,000	— 5-10	100 Rb 25-58 Rc
IC 4330	Annealed Hardened	— 130-190,000	— 100-175,000	— 5-20	20 Rc 25-48 Rc
IC 4340	Annealed Hardened	80-100 130-200,000	60-80 100-180,000	17-24 5-20	20 Rc 20-55 Rc
IC 4620	Annealed Hardened	— 110-150,000	— 90-130,000	— 10-20	100 Rb 20-32 Rc
IC 6150	Annealed Hardened	90-110 140-200,000	50-70 120-180,000	12-18 5-10	100 Rb 30-60 Rc
IC 8620	Annealed Hardened	60-80 100-130,000	40-60 80-110,000	20-25 10-20	100 Rb 20-45 Rc
IC 8630	Annealed Hardened	— 120-170,000	— 100-130,000	— 7-20	100 Rb 25-50 Rc
IC 8640	Annealed Hardened	— 130-200,000	— 100-180,000	— 5-20	20 Rc 30-60 Rc
IC 52100	Annealed Hardened	— 180-230,000	— 140-180,000	— 1-7	25 Rc 30-65 Rc

400 Series Stainless Steels

Alloy (ANSI Equivalent)	Condition	Tensile Strength (psi)	0.2% Yield Strength (psi)	% Elongation Range	Hardness Range or Max
CA-15 (410)	Annealed	—	—	—	100 Rb
	Hardened	95-200,000	75-160,000	5-12	94 Rb-45 Rc
IC 15-5	PH Hardened	135-170,000	110-145,000	5-15	26-38 Rc
CA6NM		110,000	80,000	15	30 Rc
IC 416 (416)	Annealed	—	—	—	100 Rb
	Hardened	95-200,000	75-160,000	3-8	94 Rb-45 Rc
CA-40 (420)	Annealed	—	—	—	25 Rc
	Hardened	200-225,000	130-210,000	0-5	30-52 Rc
IC 431 (431)	Annealed	—	—	—	30 Rc
	Hardened	100-160,000	75-105,000	5-20	20-40 Rc
IC 440A (440A)	Annealed	—	—	—	30 Rc
	Hardened	—	—	—	35-56 Rc
IC 440C (440C)	Annealed	—	—	—	35 Rc
	Hardened	—	—	—	40-60 Rc
IC 17-4 (CB7CU-1)	Annealed	—	—	—	36 Rb
	Hardened	150-190,000	140-160,000	6-20	34-44 Rc
CD-4MCu	Annealed	100-115,000	75-85,000	20-30	94-100 Rb
	Hardened	135-145,000	100-120,000	10-25	29-32 Rc

300 Series Stainless Steels

Alloy (ANSI Equivalent)	Condition	Tensile Strength (psi)	0.2% Yield Strength (psi)	% Elongation Range	Hardness Rb Max
CF-3 (304L)	Annealed	70-85,000	40-50,000	35-50	90
CF-8 (304)	Annealed	70-85,000	40-50,000	35-50	90
CH-20 (309)	Annealed	70-80,000	30-40,000	30-45	90
CK-20 (310)	Annealed	60-75,000	30-40,000	35-45	90
CF-3M (316L)	Annealed	70-85,000	40-50,000	35-50	90
CF-8M (316)	Annealed	70-85,000	40-50,000	35-50	90
IC 316F (316F)	Annealed	70-85,000	40-50,000	25-50	90
CF-16F (303)	Annealed	65-75,000	30-35,000	35-45	90
CF-8C (347)	Annealed	70-85,000	32-36,000	30-40	90
CN-7M (304L)	Annealed	65-75,000	25-35,000	35-45	90
HK	Annealed	65-75,000	35-45,000	10-20	100

Tool Steels

Alloy	H	A	R	D	N	E	S	S
	Annealed w/Slow Cool Max.		Cycle Anneal Max.		Hardened Range			
IC A-2	20 Rc		27 Rc		47-60			
IC A-6	100 Rb				48-59			
IC D-2			35 Rc		50-59			
IC H-11	100 Rb				46-55			
IC H-13	100 Rb				45-53			
IC 1-M-2			30 Rc		61-63			
IC M-2			30 Rc		61-63			
IC O-1			100 Rb		44-57			
IC S-1			100 Rb		44-57			
IC S-4	100 Rb				42-53			
IC S-5	100 Rb				37-59			
IC S-7			100 Rb		35-57			
Carmo								
Cast Cut 1								

Nickel Base Alloys

Alloy	Condition	Tensile Strength (psi)	0.2% Yield Strength (psi)	% Elongation Range	Hardness Range or Max
Alloy B	Annealed	75-85,000	50-60,000	8-12	90-100 Rb
Alloy C	Annealed	75-95,000	45-55,000	8-12	90 Rb-25 Rc
CW-2M	Annealed	72-87,000	40-45,000	20-30	75-90 Rb
Alloy X	As Cast	63-70,000	41-45,000	10-15	85-96 Rb
Monel A	As Cast	65-75,000	32-38,000	25-35	65-75 Rb
Monel S	Annealed	100-110,000	55-65,000	5-10	20-28 Rc
	Hardened	120-140,000	85-100,000	0	32-38 Rc
Monel E	As Cast	65-80,000	33-40,000	25-35	67-78 Rb
Inconel 600	As Cast	65-75,000	35-40,000	10-20	80-90 Rb
Inconel 625	Annealed	80-100,000	40-55,000	15-30	10-20 Rc
Invar	As cast	50-60,000	25-30,000	30-40	50-60 Rb

Cobalt Base Alloys

Alloy	Condition	Tensile Strength (psi)	0.2% Yield Strength (psi)	% Elongation Range	Hardness Rc Range
3	As Cast				48-53
6	As Cast				37-45
21	As Cast	95-130,000	65-95,000	8-20	24-32
31	As Cast	105-130,000	75-90,000	6-10	20-30
93	As Cast				60-65

Aluminum Alloys

Alloy Designation	Preferred Temper	Tensile (psi)	Yield (psi)	Elongation (%)
C355	T6	35-50,000	28-39,000	1-8
A356	T6	38-48,000	28-36,000	3-10
356	—	32-40,000	22-30,000	3-7
A357	T6	33-50,000	28-39,000	1-8
319	—	23-31,000	13-20,000	1.5
201	T6	60	50	5

Copper Alloys

	Tensile Strength (psi) Range	Yield Strength (psi) Range	% Elongation Range (in 1 in)	Hardness (Rb) Range
Copper Nickel	90-10	45	25	20
Copper Nickel	70-30	60	32	20
Red Brass	30-40,000	14-25,000	20-30	30-35
Silicon Bronze	68	24	16	

NOTE: This information is provided as a guideline only, not a specification. Other alloys are available. Any requirements for specific mechanical properties are beyond this standard and must be discussed individually. Please contact us regarding your specific requirements.



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