

	Chromium	Nickel	Max. Carbon	Max. Mangan.	Max. Phosph.	Max. Sulfur	Molybd.	Max. Silicon	Copper	Other Elements	Tensile	Yield	Approx. Hardness	Special Characteristics
300 SERIES AUSTENITIC STAINLESS: Accounts for 85%-90% of stainless fasteners; best corrosion resistance of stainless alloys; non-magnetic before cold working; low heat conductivity; good strength at higher temperatures; not hardenable by heat treatment.														
18-8 Also referred to as 300 Series or A-2	17-20% Usually 17-19%	8-13% Usually 8-10.5%	.08% Usually .03-05%	2%	.2% Usually .045%	.03-15% Usually .03%		1%	0-4% Usually 2%-3%		80,000-150,000 usual range. After cold work: 100,000-125,000 typical for 1/4-5/8 dia.; 100,000 typical for 3/4-1" dia.; 80,000-90,000 typical over 1" dia.	40,000 min. 80,000-90,000 typical 1/4-5/8 dia.; 45,000-70,000 typical for 3/4 & over dia.	B85-95	Most common designation for non-magnetic stainless fasteners; encompasses 30 to 40 various mixtures of 301, 302, 303, 304, 305 and XM7
302	17-19%	8-10%	.15%	2%	.045%	.03%		1%			90,000-125,000 Typical: 100,000	40,000 min. Typical: 50,000-70,000	B85-95	Higher carbon content than 302HQ or 304; ductile; often used in wire-type products such as springs, screens, cables, common material for flat washers.
302HQ and XM7	17-19%	8-10%	.08%-.10% XM7 Usually .02 or less	2%	.045%	.03%		1%	3-4%		80,000-140,000 usual range. After cold work: 100,000-120,000 typical for 1/4-5/8 dia.; 100,000 typical for 3/4-1" dia.; 80,000 typical over 1" dia.	40,000 min. 80,000-90,000 typical 1/4-5/8 dia.; 45,000-65,000 typical for 3/4 & over dia.	B85-95	Extra copper reduces work hardening during cold forming; commonly used for machine screws, metal screws, small nuts.
303	17-19%	8-10%	.15%	2%	.02%	.15 Min.	.6 Max.	1%			90,000-125,000	40,000 min.	B85-95	Good for machineability in products such as large nuts; not for cold forming; higher carbon and sulfur may lower corrosion resistance.
304 304L	18-20%	8-10.5%	.08%	2%	.45%	.03%		1%			85,000-150,000 usual range. After cold work: 125,000 typical for 1/4-5/8 dia.; 100,000 typical for 3/4-1" dia.; 90,000 typical above 1" dia.	40,000 min. 90,000 typical for 1/4-5/8 dia.; 50,000-70,000 typical for 3/4 & over dia.	B85-95	Most popular stainless for hex head cap screws; also frequently used for flat washers.
304L is same as 304 with max. of .03% carbon														
305	17-19%	10.5-13%	.12%	2%	.045%	.03%		1%				See 302HQ		High nickel content lowers work hardening during severe cold forming and keeps parts non-magnetic.
316 Same as A-4	16-18%	10-14%	.08%	2%	.045%	.03%	2-3%	1%	May contain 1%-3%		range. After cold work: 120,000 typical for 1/4-5/8 dia.; 95,000 typical for 3/4-1" dia.; 80,000 typical above 1" dia.	85,000-140,000 usual After cold work: 80,000-90,000 typical for 1/4-5/8 dia.; 50,000-70,000 typical for 3/4 & over dia.	40,000 min.	B85-95 Addition of molybdenum increases corrosion resistance to chloride and sulfides.
316L is same as 316 with max. of .03% carbon														
309	22-24%	12-15%	2%	2%	.045%	.03%		1%			100,000-120,000	60,000-80,000	B85-95	Low carbon increases corrosion resistance and welding capacity.
321	17-19%	9-12%	.08%	2%	.045%	.03%		1%		Titanium - 5 times carbon content		See 309		Higher chromium and nickel give better corrosion resistance at high temperatures (1900 deg. F.)
347	17-19%	9-13%	.08%	2%	.045%	.03%		1%		Columbian & Tantalum-10 times carbon.		See 309		Titanium improves intergranular corrosion resistance, by avoiding carbide precipitation; good for intermittent heating applications and corrosion resistance to 1600 deg. F.
Alloy 20	19%-21%	32.5%-35%	.06%	2.0%	.035%	.035%	2%-3%	1%	3%-4%	Columbian & Tantalum - 8 times carbon; 1% max.	100,000-150,000	65,000-135,000		Columbian and Tantalum give similar properties to 321.
														Excellent resistance to sulfuric acid. Columbian helps resist carbide precipitation.
FERRITIC STAINLESS: A few percent of stainless fasteners; magnetic; not hardenable by heat treatment; high chromium content helps corrosion resistance.														
430	16-18%		.12%	1%	.04%	.03%		1%			70,000-75,000	40,000-45,000	B65-B75	Most popular of ferritic stainless; higher carbon content adds strength; used for cold forming and hot forging but low machineability.

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<b>400 SERIES MARTENSITIC STAINLESS:</b> About 10% of stainless fasteners; magnetic; no nickel and high carbon content mean the lowest corrosion resistance among the different types of stainless. Used for elevated temperatures; can go to 1,100° F.														
400 Mixture	11.5%-14%		30% Usually .15-.30%	1.25% Usually 1%	.06% Usually .04%	.15% Usually .03%		1%			180,000-250,000 if heat treated	150,000-200,000 if heat treated	C34-C45	Carbon content towards high end of max. giving greater strength but lowering corrosion resistance.
410	11.5-13.5%		.15%	1%	.04%	.03%		1%			180,000 heat treated	150,000 heat treated	C34	Higher carbon content gives strength; most popular of the grades with 12% chrome; used in highly stressed conditions.
416	12-14%		.15%	1.25%	.06%	.15%		1%			See 410	See 410		Higher sulfur content helps machineability but lowers corrosion resistance.
420	12-14%		.30% Nom. 15% Min.	1%	.04%	.03%		1%			250,000 heat treated	200,000 heat treated	C45	Higher carbon gives greater strength but lowers corrosion resistance.
<b>BRASS, BRONZE, COPPER and NICKEL COPPER:</b> All brass and bronze are defined as copper alloy, since they contain at least 40% copper, while pure copper is defined as 99.3% minimum copper. With brass, zinc is the main alloying element. Regular bronze does not have a dominant alloying element while tin is the major alloy in phosphorus bronze internal-external lockwashers. Nickel Copper combines important ingredients of austenitic stainless and brass to give superior corrosion resistance with strength and toughness over a large range of temperatures.														
Brass Alloy 270									65%	35% Zinc	70,000	45,000	B65	Good cold forming due to high copper content; also used for milled from bar nuts.
Brass Alloy 360									61.5%	3% Lead remainder Zinc	50,000	30,000	B55	Good machineability due to added lead; good for screw machine parts.
Commercial Brass									60-65%	35-40% Zinc .05-.15 Lead	55,000	35,000	B60	Easier to cold form as copper content increases; as copper content decreases, the metal becomes stronger and harder.
Bronze Alloy 651			.07%					2.0%	98.0% min.	.05% Lead max. 1.5% Zinc max.	70,000-80,000	35,000-45,000	B70-B75	Generally used for hex head cap screws.
Bronze Alloy 655		.06%	1.5%					3.8%	94.8% min.	.05% Lead max. 1.5% Zinc max.		See Bronze 651		Used for hot forged fasteners.
Commercial Bronze								2-4%	94-96%	.05-.8% Lead .05-1.5% Zinc		See Bronze 651		Addition of lead helps machineability.
Phosphorus Bronze					.3%				96%	5% Tin	60,000	35,000	B60	Tin increases strength; phosphorus helps against stress corrosion; excellent cold forming properties.
Naval Bronze									59-62%	.5-1% Tin, 2% Lead remainder Zinc	70,000	30,000	B65	Addition of tin gives better corrosion resistance against salt water.
Copper 110									99.9% min.		Used for flat washers, copper 110 has high electrical and thermal conductivity. Low tensile strength inhibits use for fasteners.			
Nickel Copper 400		63% min.	0.3%	2.0%		.024%		0.5%	28%-34%	2.5% Iron max.	70,000-130,000	30,000-60,000	60-PC25	Particularly high corrosion resistance with nearly 2/3 nickel and 1/3 copper. Marine and chemical industries are major users.
Nickel Copper K-500		63% min.	0.25%	1.5%		.01%		0.5%	27%-33%	2.0% Iron Max. 2.3%-3.15% Alum. .35%-85% Titanium				Addition of aluminum and titanium adds strength and hardness.
<b>ALUMINUM</b> - Aluminum weights about one-third of steel, is non-magnetic with good electrical conductivity. Its strength-to-weight ratio is high. The "T" designation stands for heat-treated. Aluminum weighs 1/3 of steel.														
Aluminum 2024 T-4 heat-treated	.1% Max.			.3-.9%				.5%	3.8-4.3%	.25% Zinc Max. .5% Iron Max. 1.2-1.8% Mag. .15% Titanium Max. remainder Alum.	55,000-70,000 heat treated	40,000 heat treated	B70-B95 heat treated	Most popular of aluminum alloys; uses copper as its principal alloying element; generally used for hex head cap screws and flat washers
Aluminum 6061 T-6 heat-treated	.04-.05%			.15%				4-.8%	.15-.4%	.25% Zinc Max. .7% Iron Max. .06-1.2% Mag. .15% Titanium Max. remainder Alum.	37,000-52,000 heat treated	30,000 heat treated	B40-50 heat treated	Magnesium and silicon are the principal alloying elements; often used for hex nuts.
Aluminum 7075-T73 heat-treated a variation, 7075-T6, is used for lockwashers	.18-.35%			.3%				.4%	1.2-2%	5.1-6.1% Zinc .5% Iron Max. 2.1-2.9% Mag. 2% Titanium Max. remainder Alum.	60,000-75,000 heat treated	50,000 heat treated	B80-90 heat treated	Much higher content of zinc and magnesium than other alloys; yield and hardness also higher