STAINLESS STEEL

Austenitic stainless steels are iron-chromium-nickel alloys which are hardenable only by cold working. Nickel is the main element varied within the alloys of this class while carbon is kept to low levels. The nickel content may be varied from about 4% to 22% - higher values of nickel are added to increase to ductility of the metal. When chromium is increased to raise the corrosion resistance of the metal, nickel must also be increased to maintain the austenitic structure.

These alloys are slightly magnetic in the cold-worked condition, but are essentially non-magnetic in the annealed condition in which they are most often used. The austenitic types feature adaptability to cold forming, ease of welding, high-temperature service, and, in general, the highest corrosion resistance. Following are brief descriptions of some of our most commonly ordered stainless steels:

Type 302 stainless steel is a general purpose material with greater corrosion resistance but less work hardening than Type 301. This is the basic alloy of the austenitic group often referred to as 18:8. Machinability - 40%. Drawing or stamping - good. Welding - very good, tough welds.

Type 304 stainless steel has lower carbon to minimize carbide precipitation. It is less heat sensitive than other 18:8 steels. Used in high-temperature applications. Machinability - 45%. Drawing or stamping - very good. Welding - very good, tough welds.

Type 304L stainless steel has an extra low carbon content to avoid harmful carbide precipitation in welding applications. Its corrosion resistance is comparable to type 304. Machinability - 44%. Drawing or stamping - very good. Welding - very good, recommended for welding.

Type 316 stainless steel contains molybdenum for better corrosion resistance - particularly to pitting. Machinability - 45%. Drawing or stamping - good. Welding - very good, tough welds.

Type 316L stainless steel has a carbon content lower than 316 to avoid carbide precipitation in welding applications. Machinability - 45%. Drawing or stamping - good. Welding - very good, recommended for welding.

Typical Analysis in Percent:

Type #	UNS #	C	Cr	Ni	Mn	Si	S	P	Mo
302	S30200	.15	17-19	8-10	2.0	1.0	.03	.04	
304	S30400	.08	18-20	8-12	2.0	1.0	.03	.04	
304L	S30403	.03	18-20	8-12	2.0	1.0	.03	.04	
316	S31600	.08	16-18	10-14	2.0	1.0	.03	.04	2.0-3.0
316L	S31603	.03	16-18	10-14	2.0	1.0	.03	.04	2.0-3.0

(Percent maximum unless stated as a range or minimum.)

Typical Physical Properties:

Type #	Density lb/in^3	Specific Heat BTU/^{o}F/lb 0-100 ^{o}C	Thermal Conductivity BTU/Ft^2/Ft/Hr/^{o}F 100 ^{o}C	Coefficient of Thermal Expansion Per ^{o}F x 10^{-6} 0-100 ^{o}C	Electrical Resistivity Microhm-cm 21 ^{o}C	Magnetic Permeability (Annealed) μ
302	.29	.12	9.4	9.6	72.0	1.008
304	.29	.12	9.4	9.6	70.0	1.008
304L	.29	.12	9.4	9.6	70.0	1.008
316	.29	.12	9.4	8.9	74.0	1.008
316L	.29	.12	9.4	8.9	74.0	1.008

Typical Mechanical Properties:

(Annealed Cond.) Type #	Tensile Strength 1000 Psi	Yield Strength 1000 Psi	Elongation in 2 inches, %	Reduction of Area, %	Brinell Hardness
302	90	40	55	70	150
304	85	35	55	70	150
304L	80	30	55	70	140
316	85	35	60	70	150
316L	78	30	55	65	145