304 / 304L

This is the most versatile, and one of the most widely applied of the 300 Series Stainless steels. It has excellent forming and welding characteristics. The carefully controlled analysis of Type **304** enables it to be deep drawn more severely than Types 301 and 302 without intermediate heat softening…a characteristic that has made this grade dominant in the manufacture of drawn stainless parts such as sinks, and saucepans. It is readily brake or roll formed into a variety of other parts for application in the industrial, architectural, and transportation fields.

- Type **304** also has outstanding welding characteristics. Post-weld annealing is not required to restore the excellent performance of this grade in a wide range of mildly corrosive conditions.
- Type **304L** does not require post-weld annealing and finds extensive use in heavy gauge components, where freedom from carbide weld precipitation is often required.

Corrosion Resistance: Excellent. Exceeding that of Type 302 in a wide variety of corrosive media including hot petroleum products, steam combustion gases.

Heat Resistance: Good oxidation resistance in intermittent service to 1600^{0}F and in continuous service to 1700^{0}F. Continuous use of **304** in 800 - 1575^{0}F range is not recommended but often performs well in temperatures fluctuating above and below this range. Type **304L** is more resistant to carbide precipitation and can be used in the above temperature range.

Heat Treatment: Annealing – heat to 1850 - 2050^{0}F and cool rapidly. These grades cannot be hardened by thermal treatment.

Welding: Excellent. All standard methods. Use type 308 rods or electrodes. Heavy welded sections in Type **304** may require post-weld annealing for maximum corrosion resistance. This is not required if Type **304L** is used.

The list of applications for this general-purpose grade is very extensive and includes:

- beer barrels
- food processing equipment
- wine storage tanks
- bulk milk containers
- fire extinguisher parts
- tube skelp
- winding wire
- heat exchangers
- chemical containers

A.I.S.I. Analysis		C	Mn	P	S	Si	Cr	Ni
	304	.08 max	2.0 max	.045 max	.030 max	1.0 max	18.0 to 20.0	8.0 to 10.5
	304L	.03 max	2.0 max	.045 max	.030 max	1.0 max	18.0 to 20.0	8.0 to 12.0

Typical Mechanical Properties - Annealed	Yield Strength .2% Offset psi	Ultimate Strength psi	Elongation % in 2"	Hardness		Impact Charpy ft. – lbs.	Modules of Elasticity in Tension - psi
				Rb	BHN		
	35,000	84,000	55	80	149	135	28.0 x 10^6

Other Properties	Creep Strength 1% Flow in 10,000 hrs at 1,000^{0}F psi	Magnetic Permeability at 200 H-Annealed	Electrical Resistivity Microhm – Cm at 68^{0}F	Coefficient of Thermal Expansion (In/In/^{0}F x 10^{-6}) 32^0 - 212^{0}F	Thermal Conductivity BTU/Ft.2/Hr./^{0}F/Ft.	
					at 212^{0}F	at 932^{0}F
	17,300	1.02	72	9.6	9.4	12.4