

## 316 / 316L (1.4401) (1.4404)

Type **316** are molybdenum bearing grades. This addition gives these grades better overall corrosion resistance properties than Types 301 and 304... and higher creep strength at elevated temperatures. Type **316** gives useful service at room temperature in sulphuric acid of concentration lower than 15% and higher than 85%. It also resists chloride attack and is often selected for use in marine atmospheres.

Type **316L** with its .03 maximum carbon content is used in applications where it is not possible to anneal after welding and where maximum corrosion resistance is required.

**Corrosion Resistance:** Good resistance to a wider range of chemicals than Type 304. Highly resistant to the complex sulphur compounds used in Pulp & Paper processing. Also resists attack of marine and corrosive industrial atmospheres.

**Heat Resistance:** Good oxidation resistance in intermittent service to 1600°F and in continuous service to 1700°F. Continuous use of **316** in 800°/1575°F range not recommended but often performs well in temperatures fluctuating above and below this range. Type **316L** is more resistant to carbide precipitation and can be used in the above temperature range.

**Heat Treatment:** Annealing – heat to 1850 - 2050°F and cool rapidly. These grades cannot be hardened by thermal treatment.

**Welding:** Good characteristics suited to all standard methods. Use Type **316Cb**, **316L** or 309Cb filler rods or electrodes depending on application. Welded sections in Type **316** require post-weld annealing for maximum corrosion resistance. This is not required if Type **316L** is used.

### **Typical Applications:**

- pulp & paper equipment
- heat exchangers
- dyeing equipment
- exterior architectural components in marine coastal areas
- propeller shafts
- fittings
- photographic developing equipment

A.I.S.I. Analysis		C	Mn	P	S	Si	Cr	Ni	Mo
	316	.08 max	2.0 max	.045 max	.030 max	1.0 max	16.0 to 18.0	10.0 to 14.0	2.0 to 3.0
	316L	.03 max	2.0 max	.045 max	.030 max	1.0 max	16.0 to 18.0	10.0 to 14.0	2.0 to 3.0

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		
	42,000	84,000	50	80	149	135	28.0 x 10 <sup>6</sup>

Other Properties	Creep Strength 1% Flow in 10,000 hrs at 1,000°F psi	Magnetic Permeability at 200 H-Annealed	Electrical Resistivity Microhm – Cm at 68°F	Coefficient of Thermal Expansion (ln/ln°F x 10 <sup>-6</sup> ) 32° - 212°F	Thermal Conductivity BTU/Ft.2/Hr./°F/Ft.	
					at 212°F	at 932°F
	24,500	1.02	74	8.9	9.4	12.4