316 / 316L

Grade 316 is a molybdenum-bearing austenitic stainless steel, offering superior corrosion resistance compared to 304, especially in chloride-rich environments. 316L is the low-carbon variant, designed to minimize carbide precipitation during welding and is often dual-certified with 316.

- **316:** Offers excellent corrosion resistance and slightly higher strength, suitable for general and high-strength applications.
- **316L:** Low carbon content improves weldability and prevents carbide precipitation, ideal for welded structures.

Corrosion Resistance: 316 resists general corrosion in marine, acidic, and polluted industrial environments. The inclusion of ~2–3 % molybdenum significantly enhances resistance to pitting and crevice corrosion in chloride-containing media (e.g., seawater, chemical process equipment).

Heat Resistance: Continuous use: up to ~925 °C (850 °C intermittent).
For service above ~425 °C, variants like 316H or 316Ti are preferred due to better resistance to carbide precipitation.

Heat Treatment: Annealing: 1900–2050 °F (approx. 1040–1120 °C), followed by rapid cooling to restore corrosion resistance.
Cannot be hardened through heat treatment; instead, any strengthening is achieved via cold working.

Welding: 316L, with its reduced carbon content (< 0.03 %), is ideal for welded components over ~6 mm thick, as it shows minimal sensitization and typically doesn't need post-weld annealing. Standard fillers (e.g., 316L) produce excellent weld quality.

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

- chemical and petrochemical vessels
- food and beverage
- power generation
- piping
- medical components
- water treatment systems
- marine equipment
- heat exchangers
- acid processing

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

Typical Mechanical Properties - Annealed	Yield Strength .2% Offset psi	Ultimate Strength psi	Elongation % in 2"	Hardness (Rb)	Impact Charpy ft. – lbs.	Modules of Elasticity in Tension - psi
	28,000 – 30,000	75,000 – 77,000	40 - 42	80	25	29×10^6

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 68^0F	Thermal Expansion $32^0 – 212^0$F (In/In/^{0}F$\times 10^{-6}$)	Thermal Conductivity (BTU./ft.$_2$/hr./^{0}F/ft)
	17,300	1.01	29	9.6	8.1 – 9.4 (at 68^0F)