317 / 317L

Grade 317 is a chromium-nickel-molybdenum austenitic stainless steel with a higher molybdenum content than 316, providing enhanced corrosion resistance, especially in aggressive chemical environments.

317L is the low-carbon version, designed to minimize carbide precipitation during welding and is typically dual-certified with 317.

- **317:** Superior corrosion resistance and higher strength, suited for severe chemical and corrosive environments.
- **317L:** Lower carbon content improves weldability and resistance to sensitization, ideal for welded fabrications.

Corrosion Resistance: 317 offers excellent resistance to pitting and crevice corrosion, outperforming 316 due to its higher molybdenum content (~3–4%). It performs particularly well in chloride-rich environments, acidic solutions, and chemical processing applications. Highly resistant to phosphoric, sulfuric, and organic acids in moderate concentrations.

Heat Resistance: Continuous service: up to ~925 °C (1700 °F). Intermittent service: up to ~870 °C (1600 °F). For prolonged service above ~425 °C, stabilized or high-carbon variants (when applicable) may be considered for improved performance.

Heat Treatment: Annealing: **1900–2050 °F (1040–1120 °C)** followed by rapid cooling. Cannot be hardened through heat treatment. Strength can be increased through cold working.

Welding: 317L is preferred for welded structures due to low carbon content (<0.03%), reducing risk of carbide precipitation. Suitable for thicker sections (>6 mm). Typically, does not require post-weld annealing. Standard fillers (e.g., 317L) ensure good weld quality.

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

- chemical processing equipment
- pulp and paper industry
- flue gas desulfurization systems
- food processing equipment
- pharmaceutical equipment
- heat exchangers and condensers
- marine structures
- acid handling systems

		C	Mn	P	S	Si	Cr	Ni
A.I.S.I. Analysis	**317**	.08 max	2.0 max	.045 max	.030 max	1.0 max	18.0 to 20.0	11.0 to 15.0
	317L	.03 max	2.0 max	.045 max	.030 max	1.0 max	18.0 to 20.0	11.0 to 15.0

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
	30,000	75,000 – 80,000	40	85	25	28-29 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	Thermal Expansion 32^0 – 212^{0}F (In/In/^{0}F×10^{-6})	Thermal Conductivity (BTU./ft.$_2$/hr./^{0}F/ft)
	18,000	1.01	30	9.0 - 9.6	8.0 – 9.5 (at 68^{0}F)