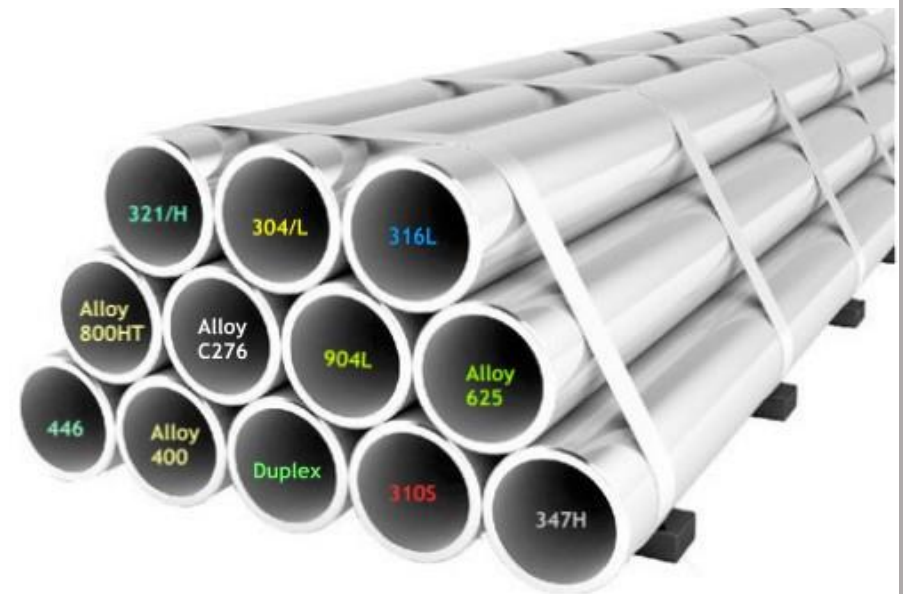


317/317L STAINLESS STEEL

Datasheet for Stainless Steel 317/317L

- Pipes & Tubes
- Sheets & Plates
- Bars & Rods, Forgings
- Fittings & Flanges
- Nuts & Bolts
- Valves



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Datasheet for Stainless Steel 317/317L

UNS S31700 (1.4449), UNS S31703 (1.4438)

What is 317/317L Stainless Steel?

- 317 is a higher chromium, nickel and molybdenum version of 316 stainless designed principally for increased strength and corrosion resistance when compared with 304/304L and 316/316L.
- 317L is similar to 316 stainless steel but provides improved resistance to atmospheric corrosion, to many organic and inorganic chemicals and to food and beverages and can produce stronger welds due to the low carbon content. 317L's molybdenum content increases to 3 to 4% from the 2 to 3% found in 316 and 316L. It has the same high strength and corrosion resistance as 317 steel but can produce stronger welds due to the low carbon content.
- Alloy 317LMN and 317L are molybdenum-bearing austenitic stainless steel tube with greatly increased resistance to chemical attack as compared to the conventional chromium-nickel austenitic stainless steel pipe such as Alloy 304. In addition, 317LMN and 317L alloys offer higher creep, stress-to-rupture, and tensile strengths at elevated temperatures than conventional stainless steels. All are low carbon or "L" grades to provide resistance to sensitization during welding and other thermal processes. Grade 317L is austenitic stainless steel that provides improved corrosion resistance over 304L and 316L stainless steels. The low carbon provides resistance to sensitization during welding and other thermal processes. 317L is non-magnetic in the annealed condition but may become slightly magnetic as a result of welding.
- The "M" and "N" designations indicate that the compositions contain increased levels of molybdenum and nitrogen respectively. The combination of molybdenum and nitrogen is particularly effective in enhancing resistance to pitting and crevice corrosion, especially in process streams containing acids, chlorides, and sulfur compounds at elevated temperatures. Nitrogen also serves to increase the strength of these alloys. Both alloys are intended for severe service conditions such as flue gas desulfurization (FGD) systems.
- In addition to excellent corrosion resistance and strength properties, the Alloys 316, 316L, and 317L Cr-Ni-Mo alloys also provide the excellent fabricability and formability which are typical of the austenitic stainless steel tubing.

Product Forms and Standards of 317/317L Stainless Steel

Product Forms	Material Standards
Plates, Sheets & Strips	ASTM A240
Billets, Bars & Rods	ASTM A276, A479.
Forgings (Flanges & Fittings)	ASTM A182

Product Forms	Material Standards
Wires	ASTM A478, A580.
Seamless and Welded Pipes	ASTM A312, A358, A269, A249, A213
Wrought Buttweld Pipe Fittings	ASTM A403

What is the Difference Between SS 316L and SS 317L?

- Grade 304, 316, and 317 stainless steel are all considered austenitic stainless steel alloys. These alloys all share some similar properties, such as high strength, corrosion resistance, and high concentrations of chromium and nickel.
- The main difference between 316 and 317 SS from 304 SS is that these higher-numbered alloys have added molybdenum in their formulation—grade 316 has about 2-3% molybdenum, and grade 317 has more than 3% molybdenum. This added molybdenum greatly improves the steel’s resistance to pitting from chlorides, which is why grade 316 SS is often used in the chemical processing and marine industries. However, this added molybdenum content also influences the cost of these two alloys. Grade 317 SS is generally more expensive than grade 316 SS. 316 SS, in turn, is more expensive than grade 304 SS. The exact extra cost varies based on the market at the time.

When do we prefer SS 317 over SS 316?

- For most strongly corrosive applications, grade 316 should be more than enough to resist frequent exposure. However, 317 does achieve better resistance to some specific corrosives than 304 or 316. In a boiling test solution of 1% hydrochloric acid, the corrosion rate of 317 SS was 54.2 mils/year, while 316 SS corroded at a rate of 226 mils/year. 317 SS also significantly outperforms 316 SS in sulfuric acid and sodium hydroxide tests. So, if your processes involve the use of very diluted (less than 3-4%) hydrochloric acid, mild concentration (10%) sulfuric acid, or sodium hydroxide, then grade 317 stainless steel might be worth the extra cost over 316 or 304 SS.
- It’s important to note that hydrochloric acid in any concentration above 5% will quickly erode any austenitic stainless steel alloy with ease. Also, in the previously-cited chemical corrosion tests, 317 performed worse against some corrosives than 316, such as phosphoric acid (0.72 mils/year vs 0.2 mils/year) and acetic acid (0.48 mils/year vs 0.12 mils/year).
- Which grade suits our project should be solely decided on the project requirements and experience.

Applications of Stainless Steel 317/317L

- Condensers in fossil

- Pulp and paper manufacturing
- Nuclear fuelled power generation stations
- Chemical and petrochemical process equipment.
- Air Pollution Control—fuel gas desulfurization systems (FGD)
- Chemical and Petrochemical
- Processing
- Explosives
- Food and Beverage Processing
- Petroleum Refining
- Power Generation—condensers
- Pulp and Paper

Stainless Steel 317/317L Product Specification

Product	Stainless Steel 317/317L
Equivalents	AISI 317, AISI 317L, 1.4449/1.4438, UNS S31700/UNS31703
Items	Pipe, Tubes, Tubing, Fittings, Flanges, Valves, Fasteners
Size	6mm to 610mm, 1/2" NB to 48" NB
Pipe Type	Seamless, Welded, ERW, Fabricated, Custom Size Pipes
Specifications	ASTM, ASME, DIN, GOST, JIS
Certification	EN 10204 3.1
Fittings Type	Butt Weld, Screwed & Socket Weld, Flanges, Instrumentation
Other Fittings	Elbows, Tees, Reducers, Caps, Stub Ends, Flanges (ANSI, Table E, D and H), Nuts, Bolts, Screws, Threaded Bars

Equivalents of Stainless Steel 317/317L

STANDARD	317	317L
UNS	S31700	S31703
WERKSTOFF NR.	1.4449	1.4438

Chemical, Mechanical & Physical Properties of Stainless Steel 317/317L

ASTM Specification

Pipe / Tube (SMLS)	Sheet / Plate	Bar	Forging	Fitting
A 213, A 249	A 167, A 240	A 276	A 182	A403

Chemical Composition

ELEMENT	317	317L
NI	11.0 – 15.0	11.0 – 15.0
C	0.08 max	0.035 max
MN	2.0 max	2.0 max
P	0.045 max	0.045 max
S	0.030 max	0.030 max

SI	1.0 max	1.0 max
CR	18.0 – 20.0	18.0 – 20.0
MO	3.0 – 4.0	3.0 – 4.0

Physical Properties

	317	317L	Temperature in °C
Density	7.99 g/cm ³	7.99 g/cm ³	Room
Specific Heat	0.12 Kcal/kg.C	0.12 Kcal/kg.C	22°
Melting Range	1371 - 1421 °C	1371 - 1421 °C	-
Modulus of Elasticity	193 KN/mm ²	193 KN/mm ²	20°
Electrical Resistivity	74 μΩ.cm	79 μΩ.cm	Room
Coefficient of Expansion	16.0 μm/m °C	16.0 μm/m °C	20 - 100°
Thermal Conductivity	16.2 W/m -°K	16.2 W/m -°K	20°

Mechanical Properties

Material	Ultimate Tensile Strength (Mpa)	0.2 % Yield Strength (Mpa)	% Elongation in 2"	Rockwell B Hardness
Alloy 317	515	205	35	95
Alloy 317L	515	205	40	95

Properties & Processing Characteristics of Stainless Steel 317/317L

Properties

1. Essentially similar to T-316; but the increased chromium, nickel and molybdenum content results in better corrosion resistance, higher tensile strength and higher creep strength than T-316.
2. Superior corrosion resistance in difficult environments.
3. Lower intergranular precipitation
4. Resistance to pitting and crevice corrosion making 317L a successful life-cost product in a variety of highly corrosive environments.
5. T-317L with .03% maximum carbon content is used to restrict carbide precipitation during welding and in applications where maximum corrosion resistance is required. In fact, for small quantities, T-317 is frequently available only as T-317L.
6. T-317 is non-magnetic in the annealed condition and is non-hardenable by heat treatment. Machinability is 39% - 65 surface feet per minute.
7. Higher creep, stress-to-rupture and tensile strengths than other stainless steels.
8. Reduced intergranular precipitation of chromium carbides during welding and stress relieving as well as minimized possibility of corrosion failure from intergranular attack due to low carbon content.
9. Improved general and localized corrosion to 316L stainless
10. Good formability
11. Good weldability

Processing/Welding

317L is readily welded by a full range of conventional welding procedures (except oxyacetylene). AWS E317L/ER317L filler metal or austenitic, low carbon filler metals with molybdenum content higher than that of 317L, or a nickel-base filler metal with sufficient chromium and molybdenum content to exceed the corrosion resistance of 317L should be used to weld 317L steel.

Fabrication Data & Other Properties of Stainless Steel 317/317L

Alloy 317L can be easily welded and processed by standard shop fabrication practices.

Machinability

- Low speeds and constant feeds will minimize this alloy's tendency to work harden. Tougher than 304 stainless with a long stringy chip, the use of chip breakers is recommended. The cold work hardening rate of Alloy 317L makes it less machinable than 410 stainless steel.

Welding

All common fusion and resistance methods except oxyacetylene welding have proven successful. Use AWS E/ER317 or 317L filler metal for best results. Alloy 317L can be readily welded by most standard processes. A post weld heat treatment is not necessary.

Hot Working

All common hot working processes are possible with this alloy. Heat to 2100-2300 F (1149-1260 C). Avoid working this material below 1700 F (927 C). For optimum corrosion resistance, a post-work annealing is recommended. If the final forming temperature falls below this threshold, a solution anneal of 1976–2156°F (1080–1180°C) is necessary. Rapid quenching is required.

Cold Working

Shearing, stamping, heading and drawing can be successfully performed . To remove internal stresses, a post-work annealing is recommended. The alloy is quite ductile and forms easily. The addition of molybdenum and nitrogen implies more powerful processing equipment may be necessary when compared with the standard 304/304L grades.

Annealing

1850-2050 F (1010-1121 C), followed by rapid cooling.

Hardening

This alloy does not respond to heat treatment. Cold work will cause an increase in both hardness and strength.

Heat Treatment & Resistance of Stainless Steel 317/317L

- All chromium-nickel-molybdenum steels all have excellent resistance to oxidation
- Demonstrates a low rate of scaling in ordinary atmospheres at temperatures up to 1600-1650°F (871-899°C).

Annealing

- The austenitic stainless steel pipe are provided in the mill annealed condition ready for use. Heat treatment may be necessary during or after fabrication to remove the effects of cold forming or to dissolve precipitated chromium carbides resulting from thermal exposures. For the Alloys 316 and 317L the solution anneal is

accomplished by heating in the 1900 to 2150°F (1040 to 1175°C) temperature range followed by air cooling or a water quench, depending on section thickness. Cooling should be sufficiently rapid through the 1500 to 800°F (816 to 427°C) range to avoid reprecipitation of chromium carbides and provide optimum corrosion resistance. In every case, the metal should be cooled from the annealing temperature to black heat in less than three minutes. 317LMN and Alloy 317L stainless steels can be annealed in the temperature range 1975-2150°F (1080-1175°C) followed by an air cool or water quench, depending on thickness. Plates should be annealed between 2100°F (1150°C) and 2150°F (1175°C). The metal should be cooled from the annealing temperature (from red/white to black) in less than three minutes.

Forging

- The recommended initial temperature range is 2100-2200°F (1150-1205°C) with a finishing range of 1700-1750°F (927-955°C).

Hardenability

- These grades are not hardenable by heat treatment. Alloys 316 and 317L stainless steel tube cannot be hardened by heat treatment.

Corrosion Resistance of Stainless Steel 317/317L

- Stainless 317/317L has a high tensile and creep strength at elevated temperatures. Due to its excellent corrosion resistance it has been used in handling many of the chemicals used by the chemical process industries especially in acidic chloride environments such as those encountered in pulp and paper mills. Increased levels of chromium, nickel and molybdenum compared to 316L stainless steel improve resistance to chloride pitting and general corrosion.
- Good oxidation resistance in continuous service to 925°C and in intermittent service to 879°C. The corrosion resistance of 317 and 317L should be the same in any given environment. The one exception is where the alloy will be exposed to temperatures in the chromium carbide precipitation range of 800–1500°F (427–816°C). Because of its low carbon content, 317L is the preferred material in this service to guard against intergranular corrosion.
- Resistance increases with molybdenum alloy content. 317L is resistant to sulfuric acid concentrations up to 5 percent at temperatures as high as 120°F (49°C). At temperatures under 100°F (38°C) this alloy has excellent resistance to solutions of higher concentration. However, service tests are recommended to account for the affects of specific operating conditions that may affect corrosion behavior. In processes where condensation of sulfur-bearing gases occurs, 317L is much more resistant to attack at the point of condensation than conventional alloy 316. The acid concentration has a marked influence on the rate of attack in such environments and should be carefully determined by service tests.

Our Key Products

Stainless Steel 317/317L Sheet	Stainless Steel 317/317L Plate Cuttings/Profiles	Stainless Steel 317/317L Nuts, Bolts and Fasteners
Stainless Steel 317/317L Plate	Stainless Steel 317/317L Foil, Coil	Stainless Steel 317/317L Wire
Stainless Steel 317/317L Blocks/Slabs	Stainless Steel 317/317L Strip	Stainless Steel 317/317L Ingot
Stainless Steel 317/317L Rod/Bar	Stainless Steel 317/317L Pipes and Tubes	Stainless Steel 317/317L Forgings and Castings
Stainless Steel 317/317L Flanges	Stainless Steel 317/317L Forged Fittings	Stainless Steel 317/317L Buttweld Fittings

About Metallica Metals – The Steel Pipes Factory

- Established in 1975, the Metallica Metals Group (The Steel Pipes Factory) has its operations spread across major cities in India. We are a pioneer in the stainless steel pipes, nickel alloy products, titanium products, carbon steel pipes and alloy steel pipes manufacturing and processing industry. Our products including pipe fittings, flanges, pipes, sheet plates and valves are exported to over 70 countries across the world, while in India we have supplied to even the remote areas. With over 250 tons of sale in stainless steel and carbon steel pipes every day, Metallica has emerged as a prominent vendor for many buyers in India and Overseas
- More than 3000 tons ready from stock and new production ready in just a few weeks.
- Feel free to contact us on - Email: info@metallicametals.com | Tel: +91 8928722715 | +91-22-66581538, +91-22-67436694, +91-22-66109768

Our Key Products

STAINLESS STEEL & NICKEL ALLOYS

Pure Nickel Alloys
Monel Alloys (Ni-Cu Alloys)
Inconel (Ni-Cr-Mo) Alloys
Incoloy Alloys (Ni-Cr-Fe)
Hastelloy Alloys
Stainless Steel 304/304L
Stainless Steel 309S/309H
Stainless Steel 310/310S
Stainless Steel 316/316L
Stainless Steel 316Ti

INSTRUMENTATION TUBES & FITTINGS

Instrumentation Tube
Hydraulic Tubing
Seamless Tubing
Instrumentation Tube Fittings
Double Compression Tube Fittings
Precision Pipe Fittings
Needle & Gauge Valves
Manifold Valves

PRODUCTS

Steel Sheet & Plate
Steel Coil & Strip
Steel Pipes
Steel Tubes
Electropolish Tube
Heat Exchanger Tubes
Steel Bars/Rods & Wire
Fasteners (Nut, Bolt, Washer)
Steel Angle Bars
Hex Steel Bars

Stainless Steel 317/317L

Stainless Steel 321/321H

Stainless Steel 347/347H

Stainless Steel 904L

Duplex Steels (UNS S32205, UNS S31803)

Super Duplex Steels (UNS S32760 / UNS
S32750)

Stainless Steel 254 SMO (UNS S31254 / 1.4547)

Round Steel Bars & Rod

Flat Steel Bars

Forgings, Rings & Forged Blocks

Stainless Steel Pipe

Stainless Steel Seamless Pipe

Stainless Steel Welded Pipe

Stainless Steel Tubes

Stainless Steel Furnace Tubes

Stainless Steel Seamless Tubing

Stainless Steel Heat Exchanger Tubes

Large Diameter Pipe

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