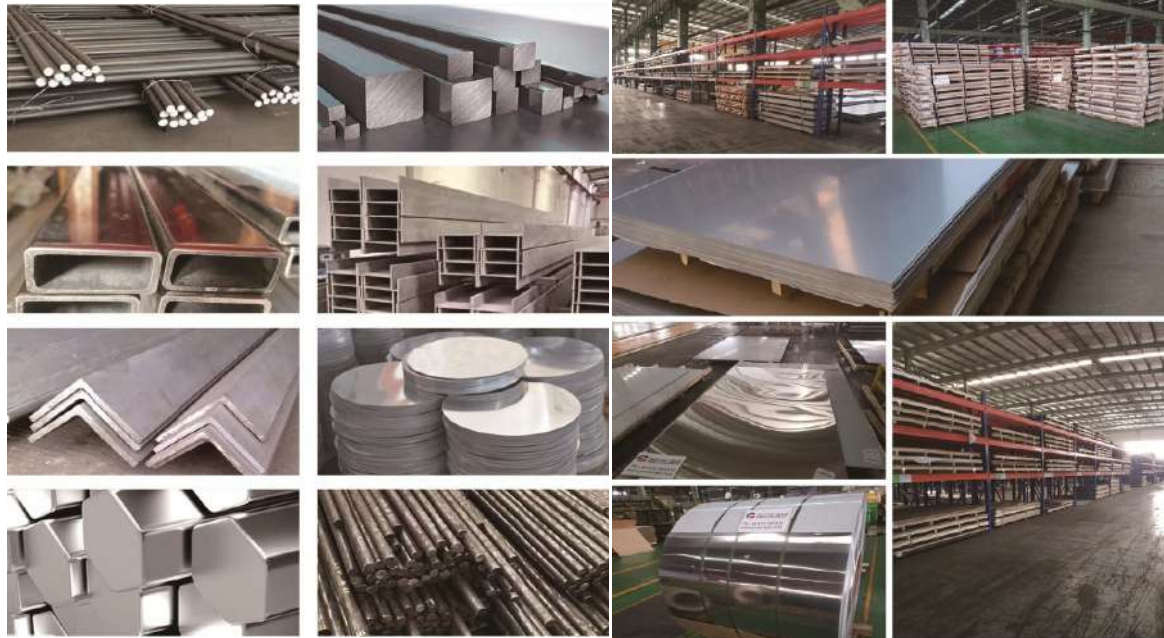


Professional Stainless Steel Supplier-GNEE

310/310S STAINLESS STEEL

Stainless Steel 310/310S

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



UNS S31000 (1.4841), UNS S31008 (1.4845)

What is 310/310S Stainless Steel?

- Alloy 310 (UNS S31000) is an austenitic stainless steel developed for use in **high temperature corrosion resistant applications**. The alloy resists oxidation up to 2010°F (1100°C) under mildly cyclic conditions. Because of its high chromium and moderate nickel content, Alloy 310 is resistant to sulfidation and can also be used in moderately carburizing atmospheres.
- The more severe carburizing atmospheres of thermal process equipment usually require nickel alloys such as 330 (UNS N08330). Alloy 310 can be utilized in slightly oxidizing, nitriding, cementing and thermal cycling applications, albeit, the maximum service temperature must be reduced. Alloy 310 also finds usage in cryogenic applications with low magnetic permeability and toughness down to -450°F (-268°C). When heated between 1202–1742°F (650–950°C) the alloy is subject to sigma phase precipitation. A solution annealing treatment at 2012–2102°F (1100–1150°C). Grade 310 (UNS S31000) and its various subgrades combine excellent high temperature properties with good ductility and weldability.
- Grade 310S (UNS S31008) is used when the application environment involves moist corrodents in a temperature range lower than that which is normally considered "high temperature" service. The lower carbon content of 310S does reduce its high temperature strength compared to 310H. 310S (UNS S31008) is the low carbon version of the alloy. It is utilized for ease of fabrication. 310H (UNS S31009) is a high carbon modification developed for enhanced creep resistance.

Stainless Steel 310/310S Products & Manufacturing Standards

Type	Sizes	Schedules	ASTM Standards
Bar	1/2" thru 6"		A276, A479
Butt Weld Fittings	1/2" thru 12"	Sch 10, 40, 80, 160 & XXH	A403
Forgings			A182
Pipe Welded & Seamless	1/4" thru 16"	Sch 10, 40, 80, 160 & XXH	A312
Tube, Welded			A249
Tube, Seamless			A213

Plate			A240
Flange & Pressure Fittings	1/2" to 60"	Sch 10, 40, 80, 160 & XXH	A182

What is the Difference Between Stainless Steel 310 and 310S?

Both types 310 Stainless Steel and 310S are typically used for elevated temperature applications.

- **Stainless Steel 310S** was designed to be the low carbon version of **SS 310**. 310S has many of the same characteristics and applications as 310, such as the ability to withstand high temperatures, resistance to oxidation and corrosion, and machinability similar to that of Type 304.
- Composed of 20% nickel and 25% chromium, 310S is efficient in reducing environments such as those that contain sulfur. Combined with its low carbon content, the metal is also effective at resisting embrittlement. **The metal is commonly utilized in extreme conditions, such as furnace manufacturing and heat-treating equipment.** While both hot and work practices can be applied, cold working is not commonly done on Stainless Steel 310S; however, it is the only way to work harden the metal. This resistance to cold temperatures is useful in cryogenic environments, as 310S is incredibly tough. However, it can be subject to thermal shock and therefore should be treated and hot-worked with care.
- In ASTM 310S, The S stands for the special treatment of the **ASTM 310 stainless steel**, mechanical properties superior to ASTM 310 stainless steel, therefore, ASTM 310S stainless steel temperature is higher than the ASTM 310 stainless steel.

310	310S
High Hardness	Low Hardness
Less Corrosion Resistance	Better Corrosion Resistance
High Carbon Content	Low Carbon Content
Less Difficult to Smelt	More Difficult to Smelt
Similar	Similar

Production Range of Stainless Steel 310/310S Materials

Product	Stainless Steel 310/310S
Equivalents	AISI 310, AISI 310S, UNS S31000, UNS S31008, WNR. 1.4841, 1.4845
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 310/310S Materials

AISI	310 / 310S
UNS	S31000 / S31008
Werkstoff Nr.	1.4841 / 1.4845

Chemical, Mechanical & Physical Properties of Stainless Steel 310/310S

Chemical Composition

	SS 310	SS 310S
Ni	19 – 22	19 – 22
Cr	24 – 26	24 – 26
C	0.25 max	0.08 max
Fe	Balance	
Mn	2 max	2 max
MO	1.50 max	1.50 max
S	0.03 max	0.03 max
P	0.045 max	0.045 max

Physical Properties

Density (lb./ in ²) @ RT		0.29
Modulus of Elasticity in Tension (psi x 10 ⁶)		29
Specific Heat (BTU/o F/lb.)	32 to 212 oF	0.12
Thermal Conductivity (BTU/hr/ft ² /ft)	212oF	8
	932oF	10.8

Mean Coefficient of Thermal Expansion (in. x 10 ⁻⁶ per o F)	68 to 212oF	8.8
	68 to 932oF	9.5
	68 to 1832oF	10.5
Electrical Resistivity (micro ohms – cm)	at 70oF	30.7
Oxidation Resistance – Continuous Service(oF)		2000

Mechanical Properties

Grade	Tensile Strength (MPa) min	Yield Strength 0.2% Proof (MPa) min	Elongation (% in 50mm) min	Hardness	
				Rockwell B (HR B) max	Brinell (HB) max
310	515	205	40	95	217
310S	515	205	40	95	217
310H	515	205	40	95	217

Applications of Stainless Steel 310/310S Plates, Pipes, Fasteners & Forgings

- Cryogenic Components
- Food Processing
- Furnaces—burners, doors, fans, piping and recuperators
- Fluidized Bed Furnaces—coal combustors, grids, piping, wind boxes
- Ore Processing/Steel Plants—smelter and steel melting equipment, continuous casting equipment
- Petroleum Refining—catalytic recovery systems, flares, recuperators, tube hangers
- Power Generation—coal gasifier internals, pulverized coal burners, tube hangers
- Sintering/Cement Plants—burners, burner shields, feeding and discharging systems, wind boxes
- Thermal Processing—annealing covers and boxes, burn