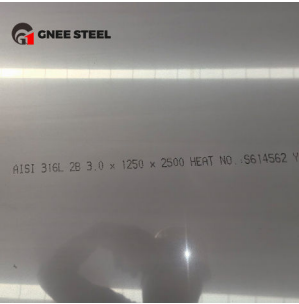
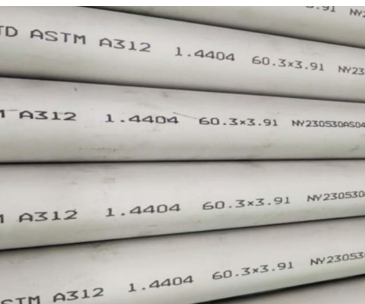


STAINLESS STEEL

SUS316L

Equivalent Grades: UNS S31603 | EN 1.4404 | AISI 316L | X2CrNiMo17-12-2

PLATE	SHEET	COIL	PIPE	TUBE	BAR
					

Product Catalog & Technical Specification Sheet

Manufacturer & Supplier: GNEE Steel Co., Ltd.

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01

Introduction to SUS316L

SUS316L is a low-carbon molybdenum-bearing austenitic stainless steel, renowned for its superior corrosion resistance compared to SUS304. The addition of 2–3% molybdenum significantly enhances resistance to pitting and crevice corrosion in chloride-containing environments, while the low carbon content (max 0.03%) provides excellent resistance to intergranular corrosion after welding. SUS316L is the preferred choice for marine, chemical, and pharmaceutical applications where enhanced corrosion performance is required.

What is SUS316L?

SUS316L is a Japanese Industrial Standards (JIS) designation for a low-carbon, molybdenum-alloyed austenitic stainless steel. The "L" suffix denotes "low carbon" ($\leq 0.03\%$), which minimizes carbide precipitation during welding and high-temperature exposure. With 16–18.5% chromium, 10–14% nickel, and 2–3% molybdenum, SUS316L offers significantly better corrosion resistance than SUS304, particularly against chlorides, acids, and marine environments.

Key Features

- Superior corrosion resistance — especially to pitting, crevice, and intergranular corrosion
- Excellent resistance to chloride and marine environments
- Low carbon content ($\leq 0.03\%$) — resists sensitization and weld decay
- Good weldability — post-weld annealing generally not required for corrosion resistance
- Molybdenum addition improves resistance to reducing acids and localized corrosion
- Hygienic surface properties — ideal for pharmaceutical and food processing
- Wide temperature range: from cryogenic to $\sim 870^{\circ}\text{C}$ continuous service
- Good strength and ductility at both room and elevated temperatures
- Non-magnetic in annealed condition (slightly magnetic after cold work)
- Excellent formability and fabricability
- 100% recyclable — environmentally sustainable material choice
- Premium corrosion performance at a cost-effective price point

Typical Applications

SUS316L is widely used in industries where corrosion resistance is critical. Its molybdenum content makes it suitable for marine environments, chemical processing, pharmaceutical manufacturing, desalination plants, and food processing involving salt or acidic conditions. The low carbon version is preferred for welded structures and heavy-section components.

Executive Standards

Standard	Description	Application
JIS G4304 / G4305	Japanese Industrial Standard	Hot/cold rolled stainless steel plate/sheet

Standard	Description	Application
ASTM A240 / A240M	American Society for Testing Materials	Pressure vessel and general purpose plate/sheet
ASTM A312	Seamless and welded austenitic steel pipe	High-temperature and general service pipe
ASTM A213 / A269	Seamless and welded austenitic steel tube	Boiler, superheater, and heat exchanger tube
ASTM A276	Stainless steel bars and shapes	Hot/cold finished bars for general use
EN 10088-1/2/3	European Norm (Material No. 1.4404)	Stainless steel — semi-finished, sheet/plate, bar
GB/T 3280 / 4237	Chinese National Standard (022Cr17Ni12Mo2)	Cold/hot rolled stainless steel plate and sheet

Supply Capability

GNEE Steel maintains extensive inventory of SUS316L products in various forms, sizes, and finishes. Our integrated supply chain and partnerships with leading mills ensure reliable delivery for both standard and custom specifications. With monthly production capacity exceeding 3,000 tons of 316L products, we serve customers worldwide with competitive lead times and flexible MOQ requirements.

收货单位 PURCHASER	合同号 CONTRACT NO.	交货日期 DATE OF DELIVERY
316L	NO20171029-357	
牌号 GRADE	订单号 ORDER NO.	交货日期 DATE OF ISSUE
316L		1909001证书号
标准 SPECIFICATION	交货状态 DELIVERY STATUS	1909001 CERTIFICATE NUMBER
ASTM A312M-03a		
序号 COIL/PLATE NO.	炉号 HEAT NO.	规格及重量 SPECIFICATION THICKNESS WIDTH LENGTH WEIGHT
1	114127160100	1413320 4.00 1500 C-1 20200 0.017 0.42 1.08 0.005 0.005 16.09 10.04 2.02 0.004
2	114133360100	1413320 6.00 1500 C-1 20200 0.019 0.44 1.28 0.001 0.002 16.50 10.04 2.00 0.000
3	114133360100	1413320 8.00 1500 C-1 20200 0.014 0.49 1.46 0.001 0.004 16.58 10.00 2.00 0.007
4	114136530100	1413652 10.00 1500 C-1 20200 0.023 0.42 1.17 0.005 0.005 16.15 10.00 2.04 0.000
5	114136530100	1413652 12.00 1500 C-1 20200 0.029 0.41 1.15 0.002 0.003 16.16 10.00 2.04 0.000
6	114136530100	1413652 15.00 1500 C-1 20200 0.029 0.41 1.15 0.002 0.003 16.16 10.00 2.04 0.000
7	114136530100	1413652 18.00 1500 C-1 20200 0.029 0.41 1.15 0.002 0.003 16.16 10.00 2.04 0.000
8	114136530100	1413652 20.00 1500 C-1 20200 0.029 0.41 1.15 0.002 0.003 16.16 10.00 2.04 0.000
9	114136530100	1413652 22.00 1500 C-1 20200 0.029 0.41 1.15 0.002 0.003 16.16 10.00 2.04 0.000
10	114136530100	1413652 25.00 1500 C-1 20200 0.029 0.41 1.15 0.002 0.003 16.16 10.00 2.04 0.000
11	114136530100	1413652 28.00 1500 C-1 20200 0.029 0.41 1.15 0.002 0.003 16.16 10.00 2.04 0.000
12	114136530100	1413652 30.00 1500 C-1 20200 0.029 0.41 1.15 0.002 0.003 16.16 10.00 2.04 0.000
13	114136530100	1413652 32.00 1500 C-1 20200 0.029 0.41 1.15 0.002 0.003 16.16 10.00 2.04 0.000
14	114136530100	1413652 35.00 1500 C-1 20200 0.029 0.41 1.15 0.002 0.003 16.16 10.00 2.04 0.000
15	114136530100	1413652 38.00 1500 C-1 20200 0.029 0.41 1.15 0.002 0.003 16.16 10.00 2.04 0.000
16	114136530100	1413652 40.00 1500 C-1 20200 0.029 0.41 1.15 0.002 0.003 16.16 10.00 2.04 0.000
17	114136530100	1413652 42.00 1500 C-1 20200 0.029 0.41 1.15 0.002 0.003 16.16 10.00 2.04 0.000
18	114136530100	1413652 45.00 1500 C-1 20200 0.029 0.41 1.15 0.002 0.003 16.16 10.00 2.04 0.000
19	114136530100	1413652 48.00 1500 C-1 20200 0.029 0.41 1.15 0.002 0.003 16.16 10.00 2.04 0.000
20	114136530100	1413652 50.00 1500 C-1 20200 0.029 0.41 1.15 0.002 0.003 16.16 10.00 2.04 0.000
21	114136530100	1413652 52.00 1500 C-1 20200 0.029 0.41 1.15 0.002 0.003 16.16 10.00 2.04 0.000
22	114136530100	1413652 55.00 1500 C-1 20200 0.029 0.41 1.15 0.002 0.003 16.16 10.00 2.04 0.000
23	114136530100	1413652 58.00 1500 C-1 20200 0.029 0.41 1.15 0.002 0.003 16.16 10.00 2.04 0.000
24	114136530100	1413652 60.00 1500 C-1 20200 0.029 0.41 1.15 0.002 0.003 16.16 10.00 2.04 0.000
25	114136530100	1413652 62.00 1500 C-1 20200 0.029 0.41 1.15 0.002 0.003 16.16 10.00 2.04 0.000
26	114136530100	1413652 65.00 1500 C-1 20200 0.029 0.41 1.15 0.002 0.003 16.16 10.00 2.04 0.000
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29	114136530100	1413652 72.00 1500 C-1 20200 0.029 0.41 1.15 0.002 0.003 16.16 10.00 2.04 0.000
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35	114136530100	1413652 88.00 1500 C-1 20200 0.029 0.41 1.15 0.002 0.003 16.16 10.00 2.04 0.000
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37	114136530100	1413652 92.00 1500 C-1 20200 0.029 0.41 1.15 0.002 0.003 16.16 10.00 2.04 0.000
38	114136530100	1413652 95.00 1500 C-1 20200 0.029 0.41 1.15 0.002 0.003 16.16 10.00 2.04 0.000
39	114136530100	1413652 98.00 1500 C-1 20200 0.029 0.41 1.15 0.002 0.003 16.16 10.00 2.04 0.000
40	114136530100	1413652 100.00 1500 C-1 20200 0.029 0.41 1.15 0.002 0.003 16.16 10.00 2.04 0.000
41	114136530100	1413652 102.00 1500 C-1 20200 0.029 0.41 1.15 0.002 0.003 16.16 10.00 2.04 0.000
42	114136530100	1413652 105.00 1500 C-1 20200 0.029 0.41 1.15 0.002 0.003 16.16 10.00 2.04 0.000
43	114136530100	1413652 108.00 1500 C-1 20200 0.029 0.41 1.15 0.002 0.003 16.16 10.00 2.04 0.000
44	114136530100	1413652 110.00 1500 C-1 20200 0.029 0.41 1.15 0.002 0.003 16.16 10.00 2.04 0.000
45	114136530100	1413652 112.00 1500 C-1 20200 0.029 0.41 1.15 0.002 0.003 16.16 10.00 2.04 0.000
46	114136530100	1413652 115.00 1500 C-1 20200 0.029 0.41 1.15 0.002 0.003 16.16 10.00 2.04 0.000
47	114136530100	1413652 118.00 1500 C-1 20200 0.029 0.41 1.15 0.002 0.003 16.16 10.00 2.04 0.000
48	114136530100	1413652 120.00 1500 C-1 20200 0.029 0.41 1.15 0.002 0.003 16.16 10.00 2.04 0.000
49	114136530100	1413652 122.00 1500 C-1 20200 0.029 0.41 1.15 0.002 0.003 16.16 10.00 2.04 0.000
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56	114136530100	1413652 140.00 1500 C-1 20200 0.029 0.41 1.15 0.002 0.003 16.16 10.00 2.04 0.000
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58	114136530100	1413652 145.00 1500 C-1 20200 0.029 0.41 1.15 0.002 0.003 16.16 10.00 2.04 0.000
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63	114136530100	1413652 158.00 1500 C-1 20200 0.029 0.41 1.15 0.002 0.003 16.16 10.00 2.04 0.000
64	114136530100	1413652 160.00 1500 C-1 20200 0.029 0.41 1.15 0.002 0.003 16.16 10.00 2.04 0.000
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66	114136530100	1413652 165.00 1500 C-1 20200 0.029 0.41 1.15 0.002 0.003 16.16 10.00 2.04 0.000
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68	114136530100	1413652 170.00 1500 C-1 20200 0.029 0.41 1.15 0.002 0.003 16.16 10.00 2.04 0.000
69	114136530100	1413652 172.00 1500 C-1 20200 0.029 0.41 1.15 0.002 0.003 16.16 10.00 2.04 0.000
70	114136530100	1413652 175.00 1500 C-1 20200 0.029 0.41 1.15 0.002 0.003 16.16 10.00 2.04 0.000
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73	114136530100	1413652 182.00 1500 C-1 20200 0.029 0.41 1.15 0.002 0.003 16.16 10.00 2.04 0.000
74	114136530100	1413652 185.00 1500 C-1 20200 0.029 0.41 1.15 0.002 0.003 16.16 10.00 2.04 0.000
75	114136530100	1413652 188.00 1500 C-1 20200 0.029 0.41 1.15 0.002 0.003 16.16 10.00 2.04 0.000
76	114136530100	1413652 190.00 1500 C-1 20200 0.029 0.41 1.15 0.002 0.003 16.16 10.00 2.04 0.000
77	114136530100	1413652 192.00 1500 C-1 20200 0.029 0.41 1.15 0.002 0.003 16.16 10.00 2.04 0.000
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79	114136530100	1413652 198.00 1500 C-1 20200 0.029 0.41 1.15 0.002 0.003 16.16 10.00 2.04 0.000
80	114136530100	1413652 200.00 1500 C-1 20200 0.029 0.41 1.15 0.002 0.003 16.16 10.00 2.04 0.000
81	114136530100	1413652 202.00 1500 C-1 20200 0.029 0.41 1.15 0.002 0.003 16.16 10.00 2.04 0.000
82	114136530100	1413652 205.00 1500 C-1 20200 0.029 0.41 1.15 0.002 0.003 16.16 10.00 2.04 0.000
83	114136530100	1413652 208.00 1500 C-1 20200 0.029 0.41 1.15 0.002 0.003 16.16 10.00 2.04 0.000
84	114136530100	1413652 210.00 1500 C-1 20200 0.029 0.41 1.15 0.002 0.003 16.16 10.00 2.04 0.000
85	114136530100	1413652 212.00 1500 C-1 20200 0.029 0.41 1.15 0.002 0.003 16.16 10.00 2.04 0.000
86	114136530100	1413652 215.00 1500 C-1 20200 0.029 0.41 1.15 0.002 0.003 16.16 10.00 2.04 0.000
87	114136530100	1413652 218.00 1500 C-1 20200 0.029 0.41 1.15 0.002 0.003 16.16 10.00 2.04 0.000
88	114136530100	1413652 220.00 1500 C-1 20200 0.029 0.41 1.15 0.002 0.003 16.16 10.00 2.04 0.000
89	114136530100	1413652 222.00 1500 C-1 20200 0.029 0.41 1.15 0.002 0.003 16.16 10.00 2.04 0.000
90	114136530100	1413652 225.00 1500 C-1 20200 0.029 0.41 1.15 0.002 0.003 16.16 10.00 2.04 0.000
91	114136530100	1413652 228.00 1500 C-1 20200 0.029 0.41 1.15 0.002 0.003 16.16 10.00 2.04 0.000
92	114136530100	1413652 230.00 1500 C-1 20200 0.029 0.41 1.15 0.002 0.003 16.16 10.00 2.04 0.000
93	114136530100	1413652 232.00 1500 C-1 20200 0.029 0.41 1.15 0.002 0.003 16.16 10.00 2.04 0.000
94	114136530100	1413652 235.00 1500 C-1 20200 0.029 0.41 1.15 0.002 0.003 16.16 10.00 2.04 0.000
95	114136530100	1413652 238.00 1500 C-1 20200 0.029 0.41 1.15 0.002 0.003 16.16 10.00 2.04 0.000
96	114136530100	1413652 240.00 1500 C-1 20200 0.029 0.41 1.15 0.002 0.003 16.16 10.00 2.04 0.000
97	114136530100	1413652 242.00 1500 C-1 20200 0.029 0.41 1.15 0.002 0.003 16.16 10.00 2.04 0.000
98	114136530100	1413652 245.00 1500 C-1 20200 0.029 0.41 1.15 0.002 0.003 16.16 10.00 2.04 0.000
99	114136530100	1413652 248.00 1500 C-1 20200 0.029 0.41 1.15 0.002 0.003 16.16 10.00 2.04 0.000
100	114136530100	1413652 250.00 1500 C-1 20200 0.029 0.41 1.15 0.002 0.003 16.16 10.00 2.04 0.000
101	114136530100	1413652 252.00 1500 C-1 20200 0.029 0.41 1.15 0.002 0.003 16.16 10.00 2.04 0.000
102	114136530100	1413652 255.00 1500 C-1 20200 0.029 0.41 1.15 0.002 0.003 16.16 10.00 2.04 0.000
103	114136530100	1413652 258.00 1500 C-1 20200 0.029 0.41 1.15 0.002 0.003 16.16 10.00 2.04 0.000
104	114136530100	1413652 2

02

Chemical Composition

The chemical composition of SUS316L defines its enhanced corrosion resistance and mechanical properties. The addition of molybdenum significantly improves resistance to pitting and crevice corrosion in chloride environments. The ultra-low carbon content (max 0.03%) ensures excellent resistance to intergranular corrosion, even after welding or prolonged high-temperature exposure.

Chemical Composition (wt. %) — JIS G4305 / ASTM A240

Element	Symbol	Minimum	Maximum	Typical Value	Purpose
Carbon	C	—	0.030	0.020	Low carbon for weld decay resistance
Silicon	Si	—	1.00	0.40	Deoxidizer & oxidation resistance
Manganese	Mn	—	2.00	1.50	Austenite stabilizer & strength
Phosphorus	P	—	0.045	0.030	Impurity — controlled for toughness
Sulfur	S	—	0.030	0.010	Impurity — controlled for corrosion resistance
Chromium	Cr	16.00	18.50	17.00	Primary corrosion resistance element
Nickel	Ni	10.00	14.00	12.00	Austenite stabilizer & acid resistance
Molybdenum	Mo	2.00	3.00	2.50	Pitting & crevice corrosion resistance
Iron	Fe	Balance	Balance	~66.5	Base metal matrix

Notes on Key Elements

- Chromium (Cr): The primary alloying element for corrosion resistance. At 16% minimum, chromium forms a self-healing passive oxide layer (Cr₂O₃) on the steel surface, providing excellent resistance to oxidation and many corrosive environments.
- Nickel (Ni): Stabilizes the austenitic (face-centered cubic) crystal structure at all temperatures, ensuring ductility and toughness. The higher nickel content (10–14%) in SUS316L enhances corrosion resistance in reducing environments and improves formability.
- Molybdenum (Mo): The key differentiating element from SUS304. Molybdenum significantly improves resistance to pitting and crevice corrosion, especially in chloride-containing environments. It also enhances resistance to sulfuric acid, acetic acid, and other reducing chemicals. PREN (Pitting Resistance Equivalent Number) ≈ 24–27.
- Carbon (C): Limited to 0.03% maximum (hence the "L" for low carbon). This ultra-low carbon content virtually eliminates the risk of sensitization (chromium carbide precipitation at grain boundaries) during welding or heat exposure in the 450–850°C range. Post-weld annealing is generally not required for corrosion resistance.

Manganese (Mn): An austenite stabilizer that partially substitutes for nickel while improving strength and hot workability.

03

Mechanical Properties

SUS316L exhibits excellent mechanical properties comparable to SUS304, with slightly lower strength due to its lower carbon content. Its austenitic structure provides excellent ductility and toughness even at cryogenic temperatures. The low carbon content makes it particularly suitable for welded structures where post-weld corrosion resistance is critical.

Room Temperature Mechanical Properties (Annealed)

Property	Symbol	Minimum	Typical	Unit	Test Standard
Tensile Strength	σ_b / Rm	485	550–650	MPa	ASTM E8 / JIS Z2241
Yield Strength (0.2%)	$\sigma_{0.2}$ / Rp0.2	170	220–280	MPa	ASTM E8 / JIS Z2241
Elongation (50mm GL)	δ / A	40	50–60	%	ASTM E8 / JIS Z2241
Hardness (Rockwell B)	HRB	—	68–82	HRB	ASTM E18
Hardness (Brinell)	HB	≤217	140–170	HB	ASTM E10
Hardness (Vickers)	HV	—	150–180	HV	ASTM E92
Modulus of Elasticity	E	—	193	GPa	—
Shear Modulus	G	—	76	GPa	—
Poisson's Ratio	ν	—	0.30	—	—

Property Variations by Temper

Mechanical properties of SUS316L vary significantly with cold working. The following table shows typical values for different tempers of cold-rolled sheet:

Temper Condition	Tensile Strength (MPa)	Yield Strength (MPa)	Elongation (%)	Hardness (HRB)
Annealed (Soft)	485–620	170–280	45–60	68–82
1/4 Hard	620–750	350–480	20–35	82–88
1/2 Hard	750–900	550–680	10–20	88–93
3/4 Hard	900–1050	730–870	5–12	93–98
Full Hard	1050–1250	900–1050	3–8	98–103

Key Notes

- SUS316L cannot be hardened by heat treatment — only by cold working (strain hardening)
- Slightly lower yield and tensile strength than SUS304 due to lower carbon content
- Cold working increases strength and hardness while reducing ductility and elongation
- Excellent ductility and toughness at cryogenic temperatures (-196°C and below)
- No ductile-brittle transition temperature — remains tough down to cryogenic range
- Low carbon content provides excellent resistance to weld decay (intergranular corrosion)
- Springback is higher than carbon steels due to lower yield strength and higher ductility

04

Physical Properties

The physical properties of SUS316L influence its behavior in thermal, electrical, and magnetic applications. These properties are important for design calculations, thermal expansion analysis, and compatibility with other materials. SUS316L properties are similar to SUS304 with minor differences due to the molybdenum and higher nickel content.

Property	Value	Unit	Condition / Note
Density	7.98	g/cm³	At 20°C (room temperature)
Density	0.288	lb/in³	At 20°C (room temperature)
Melting Point Range	1375–1400	°C	Approximate solidus-liquidus
Melting Point Range	2507–2552	°F	Approximate solidus-liquidus
Specific Heat Capacity	500	J/kg·K	At 0–100°C
Thermal Conductivity	16.2	W/m·K	At 100°C
Thermal Conductivity	21.5	W/m·K	At 500°C
Coefficient of Thermal Expansion (CTE)	16.0 × 10 ^{−6}	/°C	At 0–100°C
Coefficient of Thermal Expansion (CTE)	17.5 × 10 ^{−6}	/°C	At 0–500°C
Electrical Resistivity	74 × 10 ^{−8}	Ω·m	At 20°C
Magnetic Permeability	< 1.01	—	In annealed condition (non-magnetic)
Modulus of Elasticity (E)	193	GPa	At room temperature
Poisson's Ratio	0.30	—	At room temperature

Thermal Expansion Coefficient by Temperature

Temperature Range (°C)	Mean CTE (×10 ^{−6} /°C)	Temperature Range (°F)	Mean CTE (×10 ^{−6} /°F)
0 – 100	16.0	32 – 212	8.9
0 – 200	16.3	32 – 392	9.1
0 – 300	16.7	32 – 572	9.3
0 – 400	17.0	32 – 752	9.4

Temperature Range (°C)	Mean CTE ($\times 10^{-6} / ^\circ\text{C}$)	Temperature Range (°F)	Mean CTE ($\times 10^{-6} / ^\circ\text{F}$)
0 – 500	17.5	32 – 932	9.7
0 – 600	17.8	32 – 1112	9.9
0 – 700	18.2	32 – 1292	10.1
0 – 800	18.5	32 – 1472	10.3

Note: Thermal expansion values are important for designing assemblies involving dissimilar materials, thermal cycling applications, and high-temperature equipment. SUS316L has a slightly lower CTE than SUS304 and a higher density due to molybdenum content.

Magnetic Properties

SUS316L is essentially non-magnetic in the fully annealed condition. However, cold working (such as bending, drawing, or stretching) can induce partial transformation of austenite to martensite, resulting in slight magnetic permeability. This effect is reversible — annealing restores the non-magnetic state. For applications requiring strictly non-magnetic material, low-temperature annealing or special melting practices may be specified.

05

Corrosion Resistance

The corrosion resistance of SUS316L is among the best of the standard austenitic stainless steels. The addition of 2–3% molybdenum significantly enhances resistance to pitting and crevice corrosion, particularly in chloride-containing environments. The low carbon content ($\leq 0.03\%$) provides excellent resistance to intergranular corrosion even after welding, making SUS316L the preferred choice for corrosive service environments.

Corrosion Resistance Rating by Environment

Environment	Resistance	Notes & Limitations
Atmospheric / Rural	Excellent	Superior performance; decades of service life expected
Atmospheric / Urban	Excellent	Excellent resistance to urban and industrial pollution
Atmospheric / Marine (coastal)	Very Good	Good resistance to salt spray; suitable for coastal structures
Fresh Water (potable)	Excellent	Suitable for drinking water and desalination applications
Chlorinated Water (≤ 100 ppm Cl^-)	Very Good	Significantly better than SUS304; suitable for higher chloride levels
Salt Water / Seawater	Fair – Good	Resistant to intermittent exposure; not for prolonged immersion
Food Acids (citric, acetic)	Excellent	Widely used in food processing; better resistance to acetic acid
Dilute Sulfuric Acid	Good	Resistant up to $\sim 10\%$ concentration at ambient temperatures
Nitric Acid (dilute/conc.)	Excellent	Good resistance at all concentrations up to boiling
Phosphoric Acid	Very Good	Suitable at moderate to high concentrations and temperatures
Caustic Solutions (NaOH)	Good	Resistant up to $\sim 30\%$ concentration at room temperature
Organic Solvents	Excellent	Resistant to most alcohols, esters, ketones, hydrocarbons
Oxidizing Agents	Very Good	Good resistance to most oxidizing chemicals

Common Corrosion Types & SUS316L Performance

Uniform Corrosion

SUS316L exhibits very low uniform corrosion rates in most natural and industrial environments. Typical corrosion rates in atmospheric exposure are less than 0.001 mm/year. The molybdenum addition improves resistance to many acids, particularly sulfuric and phosphoric acids, compared to SUS304.

Pitting and Crevice Corrosion

SUS316L has significantly better resistance to pitting and crevice corrosion than SUS304 due to the molybdenum addition. The critical pitting temperature (CPT) is approximately 40–60°C in 3.5% NaCl solution, compared to 20–30°C for SUS304. Pitting Resistance Equivalent Number (PREN) $\approx$ 24–27. SUS316L is suitable for brackish water and coastal environments where SUS304 would fail.

Intergranular Corrosion (Sensitization)

Thanks to its ultra-low carbon content ($\leq 0.03\%$), SUS316L is highly resistant to sensitization (chromium carbide precipitation at grain boundaries). This means that welded SUS316L components retain their corrosion resistance without requiring post-weld annealing. SUS316L is the preferred choice for welded structures, heavy-section components, and applications involving elevated temperature exposure in the 450–850°C range.

Stress Corrosion Cracking (SCC)

While SUS316L has better resistance to chloride-induced stress corrosion cracking than SUS304, it remains susceptible at temperatures above approximately 60°C (140°F) in the presence of tensile stress and high chloride concentrations. The molybdenum addition provides some improvement, but for severe SCC conditions, duplex stainless steels or nickel alloys may be more appropriate.

Galvanic Corrosion

When SUS316L is coupled with less noble metals (e.g., carbon steel, aluminum, zinc, SUS304) in an electrolyte, the less noble metal will corrode preferentially. Conversely, coupling with more noble metals (e.g., titanium, Hastelloy) accelerates attack on SUS316L. Insulation or proper material pairing is recommended for dissimilar metal joints.

06

Temperature Performance

SUS316L demonstrates excellent performance across a wide temperature range, from cryogenic temperatures well below -196°C to elevated temperatures up to approximately 870°C (1600°F) for continuous service. Its molybdenum content provides improved high-temperature strength compared to SUS304, while the low carbon content preserves corrosion resistance after welding or high-temperature exposure.

High-Temperature Mechanical Properties

Temperature (°C)	Tensile Strength (MPa)	Yield Strength 0.2% (MPa)	Elongation (%)
20 (Room Temp)	550–650	220–280	50–60
100	520–610	160–210	48–58
200	480–570	135–185	45–55
300	450–540	120–170	42–52
400	420–510	110–160	40–50
500	380–470	100–150	38–48
600	320–400	90–130	35–45
700	210–270	65–95	40–50
800	120–160	45–70	50–60
900	65–85	30–45	60–70

Temperature Comparison: SUS316L vs SUS304 vs 310S

The following comparison highlights the temperature performance differences between three common austenitic stainless steel grades. Higher-alloyed grades offer improved high-temperature strength and oxidation resistance.

Property	SUS316L	SUS304	310S (SUS310S)
Maximum Continuous Service Temp	870°C (1600°F)	870°C (1600°F)	1150°C (2100°F)
Maximum Intermittent Service Temp	925°C (1700°F)	925°C (1700°F)	1200°C (2190°F)
Oxidation Resistance (up to)	925°C	900°C	1150°C
Creep Strength (at 600°C, 10 ⁴ h)	~70 MPa	~50 MPa	~100 MPa

Property	SUS316L	SUS304	310S (SUS310S)
Hot Strength	Good – Very Good	Good	Excellent
Thermal Expansion (0–100°C)	16.0 × 10 ⁻⁶ /°C	17.3 × 10 ⁻⁶ /°C	16.0 × 10 ⁻⁶ /°C
Thermal Conductivity (at 100°C)	16.2 W/m·K	16.2 W/m·K	14.2 W/m·K
Cryogenic Toughness	Excellent	Excellent	Good
Weld Decay Resistance	Excellent (low C)	Fair	Fair – Good
Typical High-Temp Applications	Chemical reactors, heat exchangers	Furnace parts, heat exchangers	Furnace liners, kilns, radiant tubes

Low-Temperature Performance

SUS316L maintains excellent toughness and ductility at cryogenic temperatures, making it suitable for cryogenic storage and handling equipment. Like all austenitic stainless steels, SUS316L does not exhibit a ductile-brittle transition — it remains tough down to -196°C (-321°F) and below. Its low carbon content ensures good notch toughness even in welded conditions.

Temperature (°C)	Tensile Strength (MPa)	Yield Strength (MPa)	Elongation (%)	Charpy V-Notch (J)
20	550–650	220–280	50–60	>300
0	600–700	250–310	48–58	>250
-50	700–800	290–360	45–55	>200
-100	800–900	350–420	40–50	>150
-196 (LN ₂)	950–1150	420–520	35–45	>100

Note: Values are typical for annealed material. Actual values may vary depending on product form, heat treatment, and testing direction.

07

Product Forms & Standards

GNEE Steel supplies SUS316L in a comprehensive range of product forms to meet diverse industrial requirements. All products are manufactured to internationally recognized standards and undergo rigorous quality inspection before shipment.

Plate & Sheet — ASTM A240 / A240M

ASTM A240 covers chromium and chromium-nickel stainless steel plate, sheet, and strip for pressure vessels and for general applications. SUS316L plate and sheet are available in various thicknesses, widths, and surface finishes for applications ranging from architectural cladding to chemical processing equipment.

Pipe — ASTM A312

ASTM A312 covers seamless, straight-seam welded, and heavily cold-worked welded austenitic stainless steel pipe intended for high-temperature and general corrosive service. Both seamless and welded SUS316L pipes are available in a wide range of sizes and schedules.

Tube — ASTM A213 / A269

ASTM A213: Covers seamless ferritic and austenitic alloy-steel boiler, superheater, and heat-exchanger tubes. SUS316L tubes under this standard are widely used in boiler and heat exchanger applications.

ASTM A269: Covers seamless and welded austenitic stainless steel tubing for general service, with emphasis on smooth interior surfaces suitable for fluid transport.

Bar — ASTM A276

ASTM A276 covers hot-finished or cold-finished bars including rounds, squares, and hexagons; and hot-forged or cold-finished bars of special shapes for use in corrosion-resisting and high-temperature service. SUS316L bars are available in various finishes and sizes for machining, fastener, and structural applications.

Fittings — ASTM A403

ASTM A403 covers wrought austenitic stainless steel fittings for pressure piping applications. Available fittings include elbows, tees, reducers, caps, and flanges in various sizes and pressure ratings. All fittings are manufactured from SUS316L and meet dimensional and material requirements of applicable standards.

Full Product Range Summary

Product Form	Key Standards	Available Types	Typical Applications
Plate / Sheet	ASTM A240, JIS G4304/G4305, EN 10088-2	Hot rolled, cold rolled, coil, strip	Tanks, vessels, cladding, general fabrication
Pipe	ASTM A312, JIS G3459, EN 10216-5	Seamless, welded (ERW/LSAW)	Fluid transport, structural, process piping

Product Form	Key Standards	Available Types	Typical Applications
Tube	ASTM A213, A269, JIS G3463	Seamless, welded, precision, U-bend	Heat exchangers, boilers, instrumentation
Bar / Rod	ASTM A276, JIS G4303, EN 10088-3	Round, square, hexagonal, flat, wire	Fasteners, machining, shafts, structural
Coil / Strip	ASTM A240, JIS G4305, EN 10088-2	Hot rolled coil, cold rolled coil, slit strip	Stamping, deep drawing, roll forming
Fittings	ASTM A403, MSS SP-43, JIS B2311	Elbows, tees, reducers, caps, flanges	Piping systems, process connections
Wire	ASTM A580, JIS G4309, EN 10263-5	Spring wire, welding wire, weaving wire	Springs, welding, wire mesh, fasteners

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Size Range & Specifications

GNEE Steel offers SUS316L products in an extensive range of sizes. Below are our standard size ranges for each product form. Custom sizes are available upon request — please contact our sales team with your specific requirements.

Plate & Sheet Size Range

Parameter	Hot Rolled Plate	Cold Rolled Sheet	Coil / Strip
Thickness	3.0 – 100 mm	0.3 – 3.0 mm	0.2 – 6.0 mm
Thickness (inch)	0.118 – 4.0"	0.012 – 0.118"	0.008 – 0.236"
Width	1000 – 2500 mm	1000 – 1500 mm	20 – 1500 mm
Width (inch)	39.4 – 98.4"	39.4 – 59.1"	0.8 – 59.1"
Length	2000 – 12000 mm	2000 – 3000 mm	Coil weight: up to 25 MT
Length (inch)	78.7 – 472"	78.7 – 118"	—
Standard Sizes	1220×2440, 1500×3000, 1500×6000 mm	1000×2000, 1219×2438, 1220×2440 mm	Width: 1000, 1219, 1220, 1500 mm

Pipe & Tube Size Range

Parameter	Seamless Pipe (ASTM A312)	Welded Pipe (ASTM A312)	Tube (ASTM A213/A269)
Outer Diameter (OD)	6 – 610 mm	12.7 – 2032 mm	1.6 – 114.3 mm
OD (inch)	1/4 – 24"	1/2 – 80"	1/16 – 4.5"
Wall Thickness	1.2 – 60 mm	1.6 – 50 mm	0.5 – 12 mm
Wall Thickness (Sch.)	Sch 5S – Sch 160	Sch 5S – Sch XXS	BWG 8 – BWG 30
Length	Up to 12000 mm (40 ft)	Up to 12000 mm (40 ft)	Up to 12000 mm (40 ft)
Standard Lengths	6000 mm, 12000 mm	6000 mm, 12000 mm	6000 mm, 12000 mm, coils

Bar Size Range

Bar Type	Size Range	Standard Lengths	Finish Options
Round Bar	Ø 3.0 – 500 mm (0.12 – 20")	3000 – 6000 mm (10 – 20 ft)	Hot rolled, cold drawn, polished
Square Bar	3 × 3 – 200 × 200 mm	3000 – 6000 mm	Hot rolled, cold drawn, peeled
Hexagonal Bar	6 – 100 mm A/F	3000 – 6000 mm	Cold drawn, hot rolled
Flat Bar	Thickness: 3 – 100 mm Width: 10 – 500 mm	3000 – 6000 mm	Hot rolled, cold drawn, mill finish
Angle Bar	25×25×3 – 200×200×20 mm	3000 – 6000 mm	Hot rolled, pickled
Wire Rod / Wire	Ø 0.2 – 16 mm	Coils / Cut to length	Annealed, cold drawn, spring temper

Custom Sizes Available

In addition to standard sizes, GNEE Steel provides custom-cut dimensions to meet your exact project requirements. Our advanced cutting facilities include plasma cutting, laser cutting, waterjet cutting, and shearing for precision-cut blanks and components. Custom lengths, widths, thicknesses, and special shapes can all be accommodated with fast turnaround times.

- Precision cutting services: laser, plasma, waterjet, shear, saw
- Custom coil slitting to narrow widths (minimum 20mm strip)
- Cut-to-length sheets and plates to your exact specifications
- Custom tube and pipe lengths from 100mm to 12000mm
- Bar cut-to-length with tight tolerances
- Special profiles and shapes available by request
- Minimum order quantities for custom sizes vary by product form

09

Surface Finish Options

SUS316L is available in a variety of surface finishes, each suited to different applications based on aesthetic requirements, corrosion performance, and functional needs. The surface finish significantly affects appearance, cleanability, and corrosion resistance.

Finish	Description	Ra (µm)	Appearance	Typical Applications
No.1	Hot rolled, annealed & pickled. Scaled surface from hot rolling.	~3.2 – 6.3	Dull, matte silver-gray	Industrial equipment, structural, thick plate
2B	Cold rolled, annealed & pickled, skin-passed. Most common finish.	~0.2 – 0.8	Smooth, moderately reflective	General purpose, kitchenware, appliances, tanks
BA	Bright Annealed. Cold rolled, bright annealed in controlled atmosphere.	~0.05 – 0.2	Bright, highly reflective mirror-like	Architectural trim, automotive, decorative tube
No.4	Brushed / satin finish. Polished with 120-180 grit abrasive.	~0.2 – 0.8	Uniform brushed lines, satin sheen	Kitchen equipment, appliances, architectural panels
HL	Hairline finish. Polished with finer abrasive (180-240 grit).	~0.1 – 0.4	Finer continuous lines, elegant satin	Elevators, architectural cladding, decorative panels
Mirror 8K	Mirror-polished. Polished with fine compounds to mirror finish.	~0.02 – 0.08	Near-perfect mirror reflection	Decorative, reflectors, mirrors, luxury applications

Detailed Finish Specifications

No. 1 Finish (Hot Rolled Annealed & Pickled)

Produced by hot rolling, annealing, and descaling (pickling) the steel. The surface has a dull, non-reflective appearance. This is the standard surface finish for hot-rolled plate and heavy-gauge products where surface aesthetics are not critical.

2B Finish (Cold Rolled — Bright Annealed & Pickled)

The most widely used surface finish for stainless steel. Produced by cold rolling, followed by annealing and pickling, then a final light cold roll (skin pass) for a smooth, moderately reflective surface. 2B is the standard finish for sheet and coil used in general fabrication, food processing, and chemical equipment.

BA Finish (Bright Annealed)

Produced by cold rolling followed by bright annealing in a controlled protective atmosphere (hydrogen/nitrogen mixture), which prevents oxidation during heat treatment. The result is a bright, highly reflective surface that requires no additional polishing. BA finish is commonly used for decorative applications, automotive trim, and household appliances.

No. 4 Finish (Brushed / Satin)

A mechanical polish applied with 120 to 180 grit abrasive belts or brushes, producing a uniform directional brushed pattern with a satin sheen. No. 4 finish is popular for kitchen equipment, restaurant equipment, appliances, and architectural applications where a consistent brushed appearance is desired. It also helps mask minor scratches and fingerprints.

HL Finish (Hairline)

Similar to No. 4 but produced with finer abrasives (typically 180-240 grit), resulting in finer, more uniform hairline-like scratches. HL finish offers a more refined and elegant appearance than No. 4 and is commonly used for high-end architectural applications, elevator interiors, and decorative panels.

Mirror 8K Finish

The highest level of polished finish, achieved through multi-stage mechanical polishing with progressively finer abrasives followed by buffing with polishing compounds. The "8K" designation indicates a high degree of reflectivity and smoothness. Mirror finish is used for decorative applications, reflectors, mirrors, and luxury products where maximum reflectivity is required.

Note: Surface finish availability may vary by product form, thickness, and size. Please consult with our sales team for specific availability and lead times for special surface finishes.

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Quality Control & Testing

At GNEE Steel, quality assurance is integrated into every stage of production — from raw material inspection to final product testing and certification. Our quality management system ensures that every SUS316L product meets or exceeds international standards and customer specifications.

Inspection & Testing Capabilities

Test Method	Description	Standard	Purpose
PMI Test (Positive Material Identification)	X-ray fluorescence (XRF) analysis to verify chemical composition of finished products.	ASTM E1019	Material grade verification, alloy identification, quality traceability
Tensile Test	Mechanical testing to determine tensile strength, yield strength, elongation, and reduction of area.	ASTM E8 / E8M JIS Z2241	Verification of mechanical property compliance
Hardness Test	Rockwell, Brinell, and Vickers hardness testing to verify material temper and hardness.	ASTM E10, E18, E92	Hardness verification, condition confirmation
Ultrasonic Testing (UT)	Non-destructive testing using sound waves to detect internal defects, inclusions, and laminations.	ASTM A388 / A577 EN 10160	Internal soundness, defect detection in plate/bar
Eddy Current Test	Electromagnetic non-destructive testing for surface and near-surface defects in tubes and bars.	ASTM E309 / E426 EN 10246	Surface defect detection, seam/crack detection
Dimensional Inspection	Precision measurement of thickness, width, length, diameter, wall thickness, and tolerances.	ASTM / JIS / EN product standards	Dimensional compliance verification
Surface Inspection	Visual and automated optical inspection for surface defects, scratches, pits, and finish quality.	Customer / standard specifications	Surface quality and finish verification
Hydrostatic Test	Pressure testing of pipes and tubes to verify integrity and leak-tightness under water pressure.	ASTM A312 / A213 EN 10216	Pressure boundary integrity verification
Intergranular Corrosion Test	Testing for sensitization and intergranular corrosion resistance (e.g., Strauss test, Huey test).	ASTM A262 JIS G0571	Verification of corrosion resistance after welding/heating

Certifications & Documents

All GNEE Steel products are accompanied by comprehensive documentation and certifications to provide full traceability and quality assurance for our customers.

Certificate / Document	Description	Applicable Standard
EN 10204 3.1 MTC	Material Test Certificate issued by the manufacturer's authorized inspection representative, independent of manufacturing department. Includes chemical composition, mechanical properties, and test results.	EN 10204 Type 3.1
EN 10204 3.2 MTC	Material Test Certificate with additional verification by an independent third-party inspector (customer-appointed or regulatory authority).	EN 10204 Type 3.2
SGS Inspection	Third-party inspection by SGS — one of the world's leading inspection, verification, testing, and certification companies.	SGS Testing Services
BV Inspection	Third-party inspection by Bureau Veritas — global leader in testing, inspection, and certification services.	Bureau Veritas Standards
TUV Inspection	Third-party inspection by TUV — internationally recognized German testing and certification organization.	TUV Rheinland / TUV SUD
Mill Test Report (MTR)	Comprehensive report including heat number, chemical analysis, mechanical test results, dimensions, and inspection results.	ASTM / JIS / EN mill standards
ISO 9001:2015	Quality Management System certification ensuring consistent product quality and customer satisfaction.	ISO 9001:2015
PED 97/23/EC	Pressure Equipment Directive compliance for products used in pressure vessel applications.	EU PED Directive

Note: Third-party inspections (SGS, BV, TUV) are available upon customer request and are subject to additional fees and lead time. Please specify inspection requirements at the time of order placement.

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Applications & Industries

SUS316L is the premium austenitic stainless steel of choice for applications requiring enhanced corrosion resistance. Its molybdenum content and low carbon make it indispensable in industries such as chemical processing, pharmaceuticals, marine, desalination, and food processing where chlorides, acids, or welded fabrication are involved.

Industry	Key Applications	Why SUS316L?
Chemical Processing	Reactors, storage tanks, heat exchangers, piping, valves, pumps, process vessels, centrifuges, evaporators	Superior resistance to acids, chlorides, and solvents; excellent weldability for fabrications
Pharmaceutical	Reactors, fermenters, piping systems, cleanroom equipment, tablet presses, storage vessels, biotech equipment	Hygienic non-porous surface, superior corrosion resistance, easy sterilization, weld decay resistance
Food & Beverage	Brewing equipment, dairy machinery, wine processing, food storage, piping systems, conveyor systems, pasteurizers	Hygienic surface, resistance to food acids and salt solutions, easy cleaning, FDA-compliant
Marine & Offshore	Boat fittings, deck equipment, railings, propeller shafts, offshore platform components, coastal structures	Excellent chloride and saltwater resistance; suitable for splash zones and atmospheric marine exposure
Water Treatment	Desalination plants, reverse osmosis equipment, water storage tanks, filtration systems, wastewater treatment	Superior chloride resistance, long service life in brackish and seawater environments
Medical & Surgical	Surgical instruments, implant devices, sterilization equipment, hospital fixtures, orthopedic implants	Biocompatibility, corrosion resistance to body fluids, sterilization resistance, hygienic properties
Heat Exchangers	Shell and tube heat exchangers, plate heat exchangers, condenser tubes, boiler tubes, cooling coils	Good thermal conductivity, excellent corrosion resistance, weldability, pressure vessel compatibility
Petrochemical & Oil & Gas	Refinery equipment, pipeline components, offshore platform process equipment, wellhead fittings	Resistance to sour gas, brines, and process chemicals; good weldability for field fabrication
Architecture & Construction	Coastal building facades, handrails, balustrades, swimming pool fittings, decorative trim	Aesthetic appearance, superior corrosion resistance in coastal/polluted environments, low maintenance

Additional Application Areas

- Pulp & Paper Industry: Digester components, bleaching equipment, process piping, storage tanks, white liquor systems
- Textile Industry: Dyeing equipment, fiber processing machinery, finishing equipment, chemical processing

- Power Generation: Boiler components, heat exchangers, condenser tubing, flue gas desulfurization systems
- Solar & Renewable Energy: Solar water heater tanks, concentrated solar power receivers, offshore wind farm components
- Laboratory & Scientific: Lab benches, fume hoods, autoclaves, research equipment, analytical instruments
- Mining & Mineral Processing: Leaching equipment, slurry piping, flotation cells, process vessels
- Cryogenic Storage: LNG storage and transport, cryogenic vessels, liquid nitrogen containers, cold boxes
- Automotive & Transportation: Exhaust systems (premium), marine engines, rail car components, tank trucks

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Grade Comparison Guide

Choosing the right stainless steel grade is critical for optimal performance and cost-effectiveness. The following comparisons help you understand how SUS316L stacks up against other common grades and select the most suitable material for your application.

SUS316L vs SUS304

SUS316L offers significantly better corrosion resistance than SUS304, thanks to the addition of 2–3% molybdenum and higher nickel content. The "L" low-carbon variant also provides superior resistance to intergranular corrosion after welding. While SUS304 is the economical choice for mild environments, SUS316L is preferred for more corrosive conditions and welded structures.

Property	SUS316L	SUS304
Chromium (Cr)	16.0 – 18.5%	18.0 – 20.0%
Nickel (Ni)	10.0 – 14.0%	8.0 – 10.5%
Molybdenum (Mo)	2.0 – 3.0%	—
Carbon (max)	0.03%	0.08%
Tensile Strength (min)	485 MPa	520 MPa
Yield Strength (min)	170 MPa	205 MPa
Elongation (min)	40%	40%
Density	7.98 g/cm³	7.93 g/cm³
Pitting Resistance (PREN)	~24–27	~18–20
Critical Pitting Temp (CPT)	~40–60°C	~20–30°C
Chloride Resistance	Very Good	Moderate – Good
Acid Resistance (sulfuric)	Good	Poor – Fair
Weld Decay Resistance	Excellent	Fair – Poor
Marine/Coastal	Good for atmospheric & splash zones	Not recommended for coastal exposure
Cost	Higher (~40–60% premium)	Lower (baseline)
Key Advantage	Superior corrosion + weld decay resistance	Cost-effective, versatile, widely available

SUS316L vs SUS316

SUS316 and SUS316L share the same chromium, nickel, and molybdenum content. The key difference is the carbon content: SUS316 has a maximum of 0.08% carbon, while SUS316L is limited to 0.03%. This difference is critical for welded applications, as the lower carbon virtually eliminates sensitization and weld decay. For most non-welded applications, the two grades perform similarly.

Property	SUS316L	SUS316
Carbon (max)	0.03%	0.08%
Chromium (Cr)	16.0 – 18.5%	16.0 – 18.5%
Nickel (Ni)	10.0 – 14.0%	10.0 – 14.0%
Molybdenum (Mo)	2.0 – 3.0%	2.0 – 3.0%
Tensile Strength (min)	485 MPa	520 MPa
Yield Strength (min)	170 MPa	205 MPa
Elongation (min)	40%	40%
Corrosion Resistance	Same as 316 (annealed)	Same as 316L (annealed)
Pitting Resistance (PREN)	~24–27	~24–27
Intergranular Corrosion (as-welded)	Highly resistant	Susceptible in thick sections
Weld Decay Resistance	Excellent	Fair – Good (thin sections OK)
Post-Weld Annealing Needed	Generally not required	Recommended for thick sections
Cost	Slightly higher (~5–10%)	Slightly lower
Best For	Welded structures, heavy sections, chemical plant	Non-welded parts, bar, fasteners, machined components

SUS316L vs 317L (1.4438)

SUS317L is a higher-alloyed molybdenum-bearing austenitic stainless steel with 3–4% molybdenum (vs 2–3% in 316L) and higher nickel content. This provides even better pitting and crevice corrosion resistance than SUS316L, making it suitable for more aggressive chloride environments such as pulp and paper processing, flue gas desulfurization, and chemical processing.

Property	SUS316L (1.4404)	SUS317L (1.4438)
Chromium (Cr)	16.0 – 18.5%	18.0 – 20.0%
Nickel (Ni)	10.0 – 14.0%	11.0 – 15.0%

Property	SUS316L (1.4404)	SUS317L (1.4438)
Molybdenum (Mo)	2.0 – 3.0%	3.0 – 4.0%
Carbon (max)	0.03%	0.03%
Tensile Strength (min)	485 MPa	515 MPa
Yield Strength (min)	170 MPa	205 MPa
Pitting Resistance (PREN)	~24–27	~28–32
Critical Pitting Temp (CPT)	~40–60°C	~60–80°C
Chloride Resistance	Very Good	Excellent
Sulfuric Acid Resistance	Good	Very Good
Cost	Standard molybdenum grade	Higher (~25–40% premium over 316L)
Key Application	Chemical, marine, food, pharma	Pulp & paper, FGD systems, severe chemical service

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Purchasing Guide

This purchasing guide helps you make informed decisions when sourcing SUS316L stainless steel products. From selecting the right specification to verifying material authenticity, GNEE Steel is committed to transparent and reliable supply.

How to Choose the Right SUS316L Specification

Selecting the correct specification ensures optimal performance and cost-efficiency. Consider the following factors when specifying SUS316L for your project:

Factor	What to Consider	Guidance
Product Form	Plate, sheet, coil, pipe, tube, bar, fitting?	Choose based on your application and fabrication method
Thickness / Size	What dimensions are required?	Check standard sizes first; custom sizes available but may cost more
Surface Finish	Is appearance important? What finish is needed?	2B for general industrial use; No.4/HL for decorative; Mirror 8K for premium
Corrosion Environment	What chemicals, temperatures, and chloride levels?	Confirm SUS316L is suitable; upgrade to 317L/duplex if higher corrosion needed
Temperature Range	Operating temperature range?	SUS316L OK up to 870°C continuous; consider 310S for higher temps
Welding Requirement	Will the component be welded?	SUS316L is ideal for welded fabrications — no post-weld annealing needed
Standard / Specification	Which standard must it comply with?	Specify ASTM, JIS, EN, or GB standard and grade clearly (e.g., ASTM A240 316L)
Certification Needs	What documentation is required?	Specify MTC 3.1, 3.2, third-party inspection (SGS/BV/TUV) at time of order
Quantity & Lead Time	How much and how soon?	Standard sizes in stock ship faster; custom orders require more lead time
Fabrication Method	Welding, forming, machining, stamping?	SUS316L has excellent weldability; slightly lower machinability than 304 due to higher work hardening

How to Verify Material Authenticity

Ensuring you receive genuine SUS316L material is critical, especially for corrosive and safety-critical applications. Here are key methods to verify material authenticity and confirm molybdenum content:

Verification Method	Description	Reliability
Mill Test Certificate (MTC)	Official document from the mill showing heat number, chemical composition (including Mo content), and mechanical test results.	□□□□□
PMI Testing (XRF)	Portable X-ray fluorescence analyzer provides instant verification of all key elements including molybdenum — critical for confirming 316L vs 304.	□□□□□
Spectrochemical Analysis	Laboratory-based optical emission spectroscopy (OES) provides highly accurate chemical analysis including precise Mo and C content.	□□□□□
Heat / Lot Number Traceability	Each coil, sheet, or bundle has a unique heat/lot number traceable to the original mill MTC with full composition data.	□□□□□
Molybdenum Spot Test	Chemical spot test that changes color in the presence of molybdenum. Quick way to distinguish 316L from 304 in the field.	□□□□□
Spark Test	Quick field test — grinding the metal produces sparks whose shape and color indicate the type of steel. Requires experienced operator.	□□□□□
Magnet Test	SUS316L is generally non-magnetic in annealed condition. Slightly less magnetic than 304 after cold work due to higher Ni. Not definitive alone.	□□□□□

Required Certificates & Documentation

When purchasing SUS316L stainless steel, ensure you receive the appropriate documentation for quality assurance and regulatory compliance. Common requirements include:

- Mill Test Certificate (MTC) EN 10204 3.1: Standard for every order — includes chemical composition (with Mo and C verification), mechanical properties, and dimensional verification
- EN 10204 3.2 Certificate: For critical applications — third-party witnessed testing and independent verification of molybdenum and carbon content
- Third-Party Inspection Report: SGS, BV, or TUV inspection report as specified by customer or project requirements
- Heat Treatment Report: Details of solution annealing process and parameters
- NDT Inspection Report: Ultrasonic, eddy current, or hydrostatic test results as applicable
- Corrosion Test Report: Optional — intergranular corrosion test (e.g., ASTM A262) for critical applications
- Packing List & Commercial Invoice: Standard shipping and customs documentation
- Certificate of Origin: For customs clearance and trade compliance
- ISO 9001 Quality Certificate: Manufacturer quality system certification
- PED / Pressure Equipment Directive Certification: For pressure vessel applications (EU market)

14 Frequently Asked Questions

Answers to common questions about SUS316L stainless steel. If you have additional questions, please contact our technical sales team for expert advice.

Q1. What is SUS316L stainless steel equivalent to?

SUS316L has several international equivalents: UNS S31603 (American), AISI 316L (American Iron and Steel Institute), EN 1.4404 / X2CrNiMo17-12-2 (European), 022Cr17Ni12Mo2 / S31603 (Chinese GB), and SS 2348 (Swedish). All these grades have essentially the same chemical composition — low carbon ($\leq 0.03\%$) with 16–18.5% chromium, 10–14% nickel, and 2–3% molybdenum.

Q2. What does the "L" in SUS316L mean?

The "L" in SUS316L stands for "low carbon." SUS316L has a maximum carbon content of 0.03%, compared to 0.08% for standard SUS316. This low carbon content significantly reduces the risk of sensitization (chromium carbide precipitation at grain boundaries) during welding or high-temperature exposure, making SUS316L highly resistant to intergranular corrosion (weld decay). Post-weld annealing is generally not required for corrosion resistance.

Q3. Is SUS316L food grade?

Yes, SUS316L is widely used in food and beverage processing and is generally considered food-safe. Its molybdenum content provides better resistance to food acids (especially acetic and citric acids) and salt solutions than SUS304. SUS316L is often preferred for salt-containing foods, dairy processing, and brewing applications. Compliance with food contact regulations (FDA 21 CFR, EU 1935/2004, GB 4806.9) depends on the specific grade, finish, and application.

Q4. What is SUS316L density?

The density of SUS316L is approximately 7.98 g/cm³ (0.288 lb/in³ or 7980 kg/m³) at room temperature. This is slightly higher than SUS304 (7.93 g/cm³) due to the higher nickel and molybdenum content. Density decreases slightly at elevated temperatures due to thermal expansion.

Q5. What is the difference between SUS316L and SUS304?

SUS316L differs from SUS304 in three key ways: (1) it contains 2–3% molybdenum for enhanced pitting and crevice corrosion resistance, (2) it has higher nickel content (10–14% vs 8–10.5%), and (3) it has lower carbon content ($\leq 0.03\%$ vs $\leq 0.08\%$). These differences give SUS316L significantly better chloride and acid resistance, and superior weld decay resistance. SUS316L is typically 40–60% more expensive than SUS304 due to the higher alloy content.

Q6. Can SUS316L be used in seawater?

SUS316L has better seawater resistance than SUS304, but it is NOT immune to corrosion in seawater. It performs well in atmospheric marine exposure, splash zones, and intermittently submerged conditions. However, continuous full immersion in seawater can still cause pitting and crevice corrosion, especially in warm, stagnant, or low-oxygen seawater. For prolonged seawater immersion, consider higher-alloyed grades like duplex stainless steel (2205), super austenitic grades (AL-6XN, 254 SMO), or nickel alloys.

Q7. What is the PREN value of SUS316L?

The Pitting Resistance Equivalent Number (PREN) of SUS316L is approximately 24–27. PREN is calculated as: $PREN = \%Cr + 3.3 \times \%Mo + 16 \times \%N$. With typical values of 17% Cr, 2.5% Mo, and 0.05% N, the PREN is around 25. Higher PREN values indicate better pitting corrosion resistance. For comparison, SUS304 has a PREN of ~18–20, while duplex 2205 has a PREN of ~34.

Q8. Is SUS316L magnetic?

SUS316L is essentially non-magnetic in the fully annealed condition, with magnetic permeability typically less than 1.01. However, cold working (such as bending, drawing, or machining) can induce partial transformation of austenite to martensite, resulting in slight magnetic permeability. SUS316L is slightly more stable against cold-work-induced magnetism than SUS304 due to its higher nickel content. For strictly non-magnetic applications, specify fully annealed condition or consider stabilized grades.

Q9. What is the maximum temperature for SUS316L?

SUS316L can be used continuously at temperatures up to approximately 870°C (1600°F) in oxidizing environments. For intermittent (cyclic) service, the maximum is about 925°C (1700°F). Its oxidation resistance is slightly better than SUS304 due to the molybdenum content. Thanks to its low carbon content, SUS316L retains better corrosion resistance after high-temperature exposure than standard SUS316. For higher temperatures, consider SUS310S or heat-resistant alloys.

Q10. What is the difference between SUS316L and SUS316?

SUS316 and SUS316L have the same chromium, nickel, and molybdenum content. The only significant difference is carbon: SUS316 has max 0.08% C, while SUS316L has max 0.03% C. This makes SUS316L highly resistant to weld decay (intergranular corrosion after welding). In the annealed condition, their corrosion resistance is identical. SUS316 has slightly higher tensile and yield strength, while SUS316L is the preferred choice for all welded structures and heavy sections.

Q11. Is SUS316L weldable?

Yes, SUS316L has excellent weldability and can be welded by all common methods: TIG (GTAW), MIG (GMAW), stick (SMAW), and spot welding. Matching filler metals such as ER316L or E316L (low-carbon) should be used to maintain corrosion resistance in the weld zone. One of the key advantages of SUS316L is that post-weld annealing is generally not needed for corrosion resistance, thanks to its low carbon content. This significantly reduces fabrication costs.

Q12. What standards apply to SUS316L pipe?

SUS316L pipe is covered by standards including: ASTM A312 (seamless and welded pipe for high-temperature and general corrosive service), ASTM A213 (seamless boiler, superheater, and heat-exchanger tubes), ASTM A269 (seamless and welded tube for general service), JIS G3459 (stainless steel pipes), JIS G3463 (stainless steel tubes for boiler and heat exchanger), and EN 10216-5 (seamless steel tubes for pressure purposes — stainless steel).

Q13. Can SUS316L be hardened?

No, SUS316L (like all austenitic stainless steels) cannot be hardened by heat treatment. It is hardened only by cold working (strain hardening). The only heat treatment used is solution annealing (typically 1010–1120°C / 1850–2050°F followed by rapid cooling), which softens the material, restores ductility, dissolves carbides, and maximizes corrosion resistance.

Q14. Is SUS316L suitable for medical implants?

SUS316L is widely used in medical and surgical applications, including surgical instruments, sterilization equipment, and certain types of implants. Its low carbon content and good corrosion resistance make it suitable for body fluid exposure. However, for permanent implants (e.g., orthopedic implants), special high-purity "surgical grade" 316LVM (vacuum melted) is typically specified to ensure biocompatibility and reduce the risk of sensitization. Always verify the specific medical grade requirements for your application.

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Manufacturer Profile

GNEE Steel Co., Ltd. is a leading supplier and manufacturer of stainless steel products, headquartered in China with global distribution. With over 15 years of industry experience, we specialize in providing high-quality stainless steel materials to customers worldwide, serving industries including oil & gas, petrochemical, food processing, pharmaceutical, architecture, and general manufacturing.

Available Products

- Stainless Steel Plate & Sheet: Hot rolled plate, cold rolled sheet, coil, strip — various finishes from No.1 to Mirror 8K
- Stainless Steel Pipe & Tube: Seamless pipe, welded pipe, precision tube, heat exchanger tube, U-bend tube
- Stainless Steel Bar & Wire: Round bar, square bar, hex bar, flat bar, angle bar, wire rod, wire mesh
- Stainless Steel Fittings & Flanges: Elbows, tees, reducers, caps, flanges (WN, SO, BL, SW, threaded)
- Available Grades: SUS304, 304L, 316, 316L, 321, 310S, 201, 430, 2205, 2507, and more
- Value-Added Services: Cutting, slitting, bending, welding, polishing, surface treatment, custom fabrication

Minimum Order Quantity (MOQ)

Product Form	Standard MOQ	Sample Order MOQ	Note
Plate / Sheet	500 kg	1 – 2 sheets	Small quantities available for stock sizes
Pipe / Tube	500 kg	10 – 50 meters	Small diameter tubes: lower MOQ possible
Bar / Rod	500 kg	10 – 50 kg	Cut-to-length samples available
Coil / Strip	1000 kg	100 – 500 kg	Slit strip: depends on width and gauge
Fittings / Flanges	10 pieces	1 – 5 pieces	Common sizes available from stock
Custom Fabrication	Project-based	—	Discuss with sales for custom requirements

Note: GNEE Steel offers flexible MOQ policies. We understand that every customer has unique requirements. Contact our sales team to discuss your specific needs — we will do our best to accommodate orders of all sizes.

Lead Time

Order Type	Standard Lead Time	Expedited Service	Note
Stock Items (ex-warehouse)	3 – 7 days	1 – 3 days	Ready to ship from inventory
Standard Production	10 – 20 days	7 – 12 days	For common sizes and specifications

Order Type	Standard Lead Time	Expedited Service	Note
Custom Size / Finish	15 – 30 days	—	Custom cutting, slitting, or special surface
Custom Fabrication	20 – 45 days	—	Depends on complexity and quantity
Sea Freight (to port)	20 – 35 days	—	Depending on destination port
Air Freight	5 – 10 days	3 – 5 days	For urgent small orders only
Express Courier (DHL/FedEx)	3 – 7 days	1 – 3 days	For samples and small packages

Contact GNEE Steel

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Your Free Quote Today! Contact our experienced sales team for competitive pricing, technical consultation, and

Thank you for considering GNEE Steel as your stainless steel supplier. We look forward to serving you.