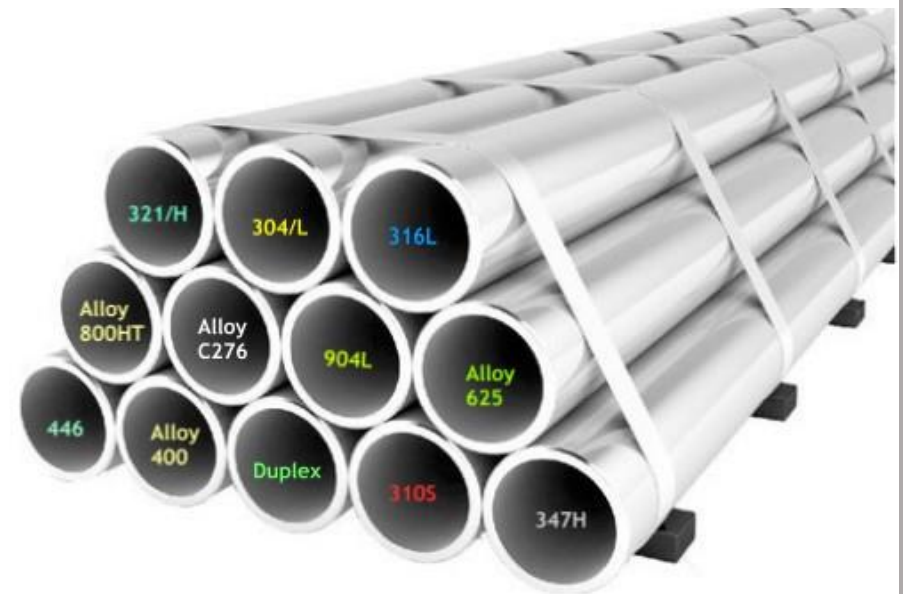


904L STAINLESS STEEL

Datasheet for Stainless Steel 904L

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



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Datasheet for Stainless Steel 904L

UNS N08904, DIN Equivalent W.Nr. 1.4539

What is 904L Stainless Steel?

- 904L also known as UNS N08904 or 1.4539 is an austenitic stainless steel alloy material. It has high molybdenum and non-stabilised extremely low carbon content.
- 904L does have very substantial contents of the high cost ingredients nickel and molybdenum. Due to addition of Copper, it has increased resistance to phosphoric, sulphuric and hydrochloric acid concentration. It is sometimes referred to as super austenitic stainless steel due to superiority over other 300 series austenitic steel grades. 904L is also resistant to chloride and sea water attack. 904L is primarily used in production and transport of phosphoric acid as well as in environment containing concentrations of phosphoric acid or phosphorous gas.

Product Forms and Standards of 904L Stainless Steel

Product Forms	Material Standards
Plates, Sheets & Strips	ASTM A240
Billets, Bars & Rods	ASTM A276, A479, A484
Forgings (Flanges & Fittings)	ASTM A182
Wires	ASTM A313, A580.
Seamless and Welded Pipes	ASTM A312, A358, A213, A249, A269, A270
Wrought Buttweld Pipe Fittings	ASTM A403

- Metallica supplies SS904L in various grades such as ASTM A312 TP904L (Pipes), ASTM A182 F904L (Forgings), ASTM A403 WP904L (Buttweld Fittings, ASTM A240 TP904L (Sheets & Plates).

What is the Difference Between SS 904L and SS 316L ?

- 904L is an austenitic grade stainless steel with low carbon and higher resistance to stress and crevice corrosion cracking as compared to AISI 316 & AISI 317 stainless steel grades.
- SS 904L has low carbon content and copper has been added to it, to increase its resistance against strong reducing acids, like sulphuric acid. SS316L is a low carbon version of 316 and to this, molybdenum has been added, which gives it good resistance to corrosion. 1.4539 Stainless Steel displays superb resistance to chloride attacks and even warm seawater. SS316L shows very good resistance to corrosion in various corrosive media and atmospheric environments. But, though SS316L is considered to be a lower cost option, its resistance to corrosion is much lesser.
- 904L has greater amounts of chromium and nickel than the 316L grade. It is typically used in the chemical industry for severe corrosion Environments i.e better resistance to pitting, SCC, IGC etc. 316L Stainless steel is far less scratch resistant than the 904L because it has a much higher Rockwell hardness. The 316L has less nickel in it and is far brighter in appearance and tends to stay that way. Nickel can be an irritant. Many of the applications in which this grade has previously performed well can now be fulfilled at lower cost by duplex stainless steel 2205 (S31803 or S32205), so 904L is used less commonly than in the past.

Applications of Stainless Steel 904L

- Petroleum, petrochemical equipment, such as reactors in petrochemical equipment.
- National Defence
- Nuclear industry
- Aviation
- Power generation
- Wiring in electrostatic precipitators
- Oil refinery components
- Seawater cooling devices
- Gas scrubbing plants
- Pulp and paper processing industries
- Acetic, phosphoric and sulphuric acid processing plants
- Storage and transportation equipment for sulfuric acid, such as heat exchangers.
- Power plant flue gas desulfurization device, the main use parts are: tower body of the absorption tower, flue, door panel, internal parts, sprinkler system, etc.
- Washers and fans in organic acid treatment systems.

Properties, Limitations and Processing Characteristics of Stainless Steel 904L

Characteristics

- 904L is a high-alloy austenitic stainless steel with a very low carbon content. The steel is designed for harsh environments. The alloy was originally developed for corrosion resistance in dilute sulfuric acid. This feature has been proven to be very successful after many years of practical application. The 904L is now standardized in many countries and has been approved for the manufacture of pressure vessels.
- Like other commonly used CrNi austenitic steels, 904L alloy has good resistance to pitting corrosion and crevice corrosion, high resistance to stress corrosion cracking, good resistance to intergranular corrosion, good processability and Weldability. The maximum heating temperature for hot forging can reach 1180 degrees Celsius, and the minimum stop forging temperature is not less than 900 degrees Celsius. This steel thermoforming can be carried out at 1000--1150 degrees Celsius. The heat treatment process of the steel is 1100--1150 degrees Celsius, and is quickly cooled after heating.

Processing/Welding

- Welding of grade 904L stainless steels can be performed using all conventional methods. This grade does not require pre-heat and post-weld heat treatments. Grade 904L can be subjected to hot cracking in constrained weldment. Grade 904L electrodes and rods are used for welding grade 904L steels according to AS 1554.6.

Stainless Steel 904L Product Specification

Product	Stainless Steel 904L
Equivalents	AISI 904L, UNS N08904, 1.4539
Items	Pipe, Tubes, Tubing, Fittings, Flanges, Valves, Fasteners, Sheet, Square Bar, Threaded Bar, Plate, Hexagon Bar, Fasteners and Fixings, Round Bar, Flat Bar, Rebar, Angle, Tube & Pipe, Wire
Size	1/4" - 60"
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 904L

Standard	904L
UNS	N08904
Werkstoff Nr.	1.4539

Chemical, Mechanical & Physical Properties of Stainless Steel 904L

SS 904L Chemical Composition

C	≤0.020
Mn	≤2.00
P	≤0.045
S	≤0.035
Si	≤1.00
Cr	19.0-23.0
Ni	23.0-28.0
Mo	4.0-5.0
N	≤0.10
Cu	1.0-2.0

SS 904L Physical Properties

Grade	Density (kg/m ³)	Elastic Modulus (GPa)	Mean Co-eff of Thermal Expansion (μm/m/°C)			Thermal Conductivity (W/m.K)		Specific Heat 0-100°C (J/kg.K)	Elec Resistivity (nΩ.m)	Melting Point
			0-100°C	0-315°C	0-538°C	At 20°C	At 500°C			
904L										
	7900	190	15	-	-	11.5	-	500	952	1300-1390 °C

SS 904L Mechanical Properties

Grade	Tensile Strength (MPa) min	Yield Strength 0.2% Proof (MPa) min	Elongation (% in 50mm) min	Hardness	
				Rockwell B (HR B)	Brinell (HB)
904L					
	490	220	36	70-90 typical	150

Fabrication Data and Other Properties of 904L Stainless Steels

Alloy 904L stainless steel products can be easily welded and processed by standard shop fabrication practices.

Hot forming

- Working temperatures of 1562–2102°F (850–1150°C) are recommended for hot working processes. Normally hot working should be followed by a solution anneal and quench, but for 904L, if hot forming is discontinued at a temperature above 2012°F (1100°C) and the material is quenched directly thereafter, the material may be used without subsequent heat treatment. It is important that the entire workpiece be quenched from temperatures above 2012°F (1100°C). In the event of partial heating or cooling below 2012°F (1100°C), or if the cooling has been too slow, hot working should always be followed by a solution anneal and quenching. 904L should be solution annealed at 1940–2084°F (1060–1140°C).

Cold forming

- Although higher forces are required, 904L will respond in a similar fashion to other austenitic stainless steels like 304, 316 or 317. Most common operations can be successfully performed

Machining

- The cold work hardening rate of Alloy 904L makes it less machinable than 410 and 304 stainless steels.

Annealing

- 1920-1990 Deg F (1050-1090 Deg C), rapid cooling.

Hardening

- This alloy does not respond to heat treatment. It may only be hardened by cold reduction.

Corrosion Resistance of Stainless Steel 904L

- In general welding and heat treatment, there will not be carbide precipitation because the carbon content is very low (0.020% maximum). This eliminates the intergranular corrosion after the welding and heat treatment.
- Due to high nickel, chromium, molybdenum, and copper element, 904L stainless steel can be used in heavy reducing environments, such as in sulfuric acid and formic acid. High nickel content also has a lower corrosion rate in the activity state. In the range of 0 ~ 98% concentration pure sulfuric acid, the use of SS 904L can be done at temperature as high as 40°C. In the range of 0 ~ 85% concentration pure sulfuric acid, its corrosion resistance is very good.
- 904L corrosion resistance is better than ordinary stainless steel in all kinds of phosphoric acid.
- In the hydrochloric acid, SS 904L is limited to use in lower concentrations of 1-2%. In this concentration range, 904L corrosion resistance is better than generic stainless steel.
- Ordinary austenitic stainless steel in the temperature higher than 60°C may be sensitive of the stress corrosion resistance in a rich chloride environment. By increasing the nickel content in stainless steel, this sensitivity can be reduced. Due to the high content of nickel, 904L exhibits high stress corrosion cracking capacity in chloride solution.

Our Key Products

Stainless Steel 904L Sheet	Stainless Steel 904L Plate Cuttings/Profiles	Stainless Steel 904L Nuts, Bolts and Fasteners
Stainless Steel 904L Plate	Stainless Steel 904L Foil, Coil	Stainless Steel 904L Wire
Stainless Steel 904L Blocks/Slabs	Stainless Steel 904L Strip	Stainless Steel 904L Ingot
Stainless Steel 904L Rod/Bar	Stainless Steel 904L Pipes and Tubes	Stainless Steel 904L Forgings and Castings
Stainless Steel 904L Flanges	Stainless Steel 904L Forged Fittings	Stainless Steel 904L Butt Weld 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

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[Incoloy Alloys \(Ni-Cr-Fe\)](#)
[Hastelloy Alloys](#)
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[Stainless Steel 309S/309H](#)
[Stainless Steel 310/310S](#)
[Stainless Steel 316/316L](#)
[Stainless Steel 316Ti](#)

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[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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