304&316 Stainless Steel

● What is the stainless steel?

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Stainless steel is the name given to a group of corrosion resistant and high temperature steels. Their remarkable resistance to corrosion is due to a chromium-rich oxide film which forms on the surface. When ordinary carbon steel is exposed to rain water, for example, it corrodes forming a brown iron oxide, commonly called rust, on the surface. This is not protective and eventually the entire piece of steel will corrode and be converted to rust. But when enough chromium (more than about 10%) is added to ordinary steel, the oxide on the surface is transformed - it is very thin, virtually invisible and protective in a wide range of corrosive media. This is what we call stainless steel and there are several different types, and many different grades.

● Stainless steel designation

SAE designation	UNS designation	% C	% Cr	% Ni	% Mn	% Si	% P	% S	% Mo
304	S30400	≤ 0.08	18.00–20.00	8.00–10.00	≤ 2.0	≤ 1.0	≤ 0.035	≤ 0.03	-
316	S31600	≤ 0.08	16.00–18.00	10.00–14.00	≤ 2.0	≤ 1.0	≤ 0.035	≤ 0.03	2.00-3.00

(SAE:The Society of Automotive Engineers; UNS:The unified numbering system)

Type 304—the most common grade; the classic 18/8 stainless steel. Outside of the US it is commonly known as "A2", in accordance with ISO 3506 (not to be confused with A2 tool steel).

Type 316—the second most common grade (after 304);alloy addition of molybdenum prevents specific forms of corrosion. It is also known as marine grade stainless steel due to its increased resistance to chloride corrosion compared to type 304. 316 is often used for building nuclear reprocessing plants. 316L is an extra low carbon grade of 316, generally used in stainless steel watches and marine applications,

as well exclusively in the fabrication of reactor pressure vessels for boiling water reactors, due to its high resistance to corrosion. Also referred to as "A4" in accordance with ISO 3506.

● Advantage

Corrosion resistance

Lower alloyed grades resist corrosion in atmospheric and pure water environments, while high-alloyed grades can resist corrosion in most acids, alkaline solutions, and chlorine bearing environments, properties which are utilized in process plants.

Fire & heat resistance

Special high chromium and nickel-alloyed grades resist scaling and retain strength at high temperatures.

Hygiene

The easy cleaning ability of stainless makes it the first choice for strict hygiene conditions, such as hospitals, kitchens, abattoirs and other food processing plants.

Aesthetic appearance

The bright, easily maintained surface of stainless steel provides a modern and attractive appearance.

Strength-to-weight advantage

The work-hardening property of austenitic grades, that results in a significant strengthening of the material from cold-working alone, and the high strength duplex grades, allow reduced material thickness over conventional grades, therefore cost savings.

Ease of fabrication

Modern steel-making techniques mean that stainless can be cut, welded, formed, machined, and fabricated as readily as traditional steels.

Impact resistance

The austenitic microstructure of the 300 series provides high toughness, from elevated temperatures to far below freezing, making these steels particularly suited to cryogenic applications.

Long term value

When the total life cycle costs are considered, stainless is often the least expensive material option.