

310S Stainless Steel - Technical Specification (UNS S31008)

310S stainless steel is a low carbon version of 310 and is known for its excellent resistance to oxidation, carburization, and high-temperature corrosion. It is an austenitic chromium-nickel alloy designed for service in high-temperature environments. The lower carbon content of 310S provides superior weldability and reduces the risk of carbide precipitation during welding.

Equivalent Grades of Stainless Steel 310S Bars:

STANDARD	WERKSTOFF NR.	UNS	JIS	BS	GOST	EN
SS 310S	1.4845	S31008	SUS 310S	310S16	20Ch23Ni18	X8CrNi25-21

The chemical composition of grade 310S (typical values) is presented in the following table:

Element	C	Cr	Ni	Si	S	Mn	P
%	0.08	24.0 - 26.0	19.0 - 22.0	1.5	0.015	2.00	0.045

General Characteristics

- The austenitic stainless steel 310S (UNS S31008/AISI 310S) has about 25% Cr, 0.6% Si and 20% Ni. This grade is known for its behavior of corrosion resistance at high temperature. The additions of carbon are optimized in order to improve its creep deformation resistance. The steel can easily be welded. AISI

310S is projected for high temperature applications, up to 1100° C, in oxidating atmospheres.

- The steel can also be used under conditions of slightly oxidating atmosphere, nitriding, cementation and sulfuring as well as with thermal cycles, although temperature must be reduced.
- This stainless steel is widely used in the thermal treatment industry for parts of furnaces, such as refractories support, parts of burners, conveyor belts, furnace lining, fans, etc.; in the food industry, they are used in contact with heated citric and acetic acids

Temperature Resistance

- Oxidation Resistance: up to **1100° C (2010° F)** in continuous service
- Excellent in **cyclic thermal environments**
- Good performance in **sulfidizing and carburizing atmospheres**

Corrosion Resistance

- Grade AISI 310S is mainly used at high temperature due to its corrosion resistance. The typical working temperatures for an atmosphere with maximum Sulfur content of 2g/m³ are 1050°C (continuous service) and 1100°C (peak temperature). Sulfur contents higher than 2g/m³ decrease maximum temperature to 950°C.
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- After a long period of exposure to high temperature, grade AISI 310S can be susceptible to intergranular corrosion due to precipitation of chromium carbides. Anyway, this grade is resistant to electrochemical corrosion due to its high content of chromium and nickel.

Welding

Grade AISI 310S can be welded using the majority of welding processes: TIG, MIG, plasma, submerged arc, coated electrode and tubular wire. The electrodes AWS/ASME E310 - 15 or wires AWS/ASME ER 310 are commonly used. For the welding of the finishing pass, the use of AWS/ASME E309 - 15 or wires AWS/ASME ER 309 is recommended. If the fluidity of the weld pool is a problem, the use of filler metals with silicon (ER309LSi or ER309Si) are recommended.

The mechanical properties of the welded joints are improved for processes of submerged arc welding using basic flow and for processes with argon shielding gas.

Typical welding practices will minimize the effect of carbides precipitation (sensitization) and the formation of hot tears. Depending on the welding process used, oxidation must be removed in order to guarantee the restauration of the corrosion resistance. Such removal can be made with stainless brushes or chemical baths (local pickling) using a paste containing a mixture of nitric and fluoridric acids. In the latter case, it requires a strong cleaning with water to remove all traces of pickling gel.

Available Standards of 310S Material

Standard	Description
ASTM A240	Plate, Sheet, and Strip
ASTM A276	Bars and Shapes
ASTM A312	Seamless and Welded Pipes
ASTM A213	Tubes for Boilers and Heat Exchangers
ASTM A479	Bars for Pressure Vessels
ASME SA240 / SA276 / SA312	ASME Boiler Code equivalents