AISI 310S

Austenitic stainless steel for high temperatures

TYPICAL AMERICAN DENOMINATION AISI 310S

Chemical Composition

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

According to ASTM A240/A240M Standard.

General Characteristics

The austenitic stainless steel 310S (UNS S31008/AISI310S) 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.

Delivery Conditions*

- Products: coils, sheets hot rolled

Thickness range (mm)	Mill edge width (mm)	Slitted edge width (mm)
4,00 to 12,70	1040, 1240, 1270	1000, 1020, 1200, 1219, 1220, 1250
14,00 to 50,80	1040, 1240, 1270, 1320, 1540	1000, 1020, 1200, 1219, 1220, 1250, 1300, 1500, 1524

* For further information please contact Aperam South America.

Mechanical Properties

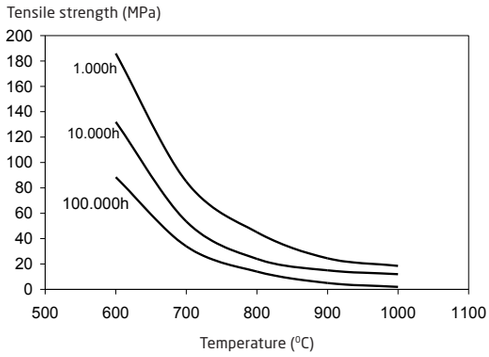
The table below presents the typical result of traction test according to standard ASTM E-8 M: Samples were obtained in the longitudinal section to the rolling direction, specimen with Lo = 50 mm and 5.0 mm thickness.

Mechanical properties	Tensile Strength (MPa)	Yield Strength 0.2% (MPa)	Elongation (%)	Hardness (HRB)
Typical values	580	280	50	80

Physical Properties

The main physical properties are presented in the following table.

Density (g/cm³)	8,03
Thermal conductivity (100°C) – (W/m.K)	13,9
Coefficient of thermal expansion (20-100°C) -(µm/m.°C)	15,7
Coefficient of thermal expansion (20-500°C) -(µm /m.°C)	17,1
Coefficient of thermal expansion (20-1000°C) -(µm /m.°C)	18,9
Modulus of elasticity (GPa)	200



The Figure above shows values of tensile strength in creep deformation test..

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 1050ºC (continuous service) and 1100ºC (peak temperature). Sulfur contents higher than 2g/m³ decrease maximum temperature to 950ºC.

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.

www.aperam.com

Aperam South America Av. Carandaí, 1.115 | 23º andar | 30130-915 | Belo Horizonte | MG | Brasil | Tel.: 55 (31) 3235-4200 | Fax: 55 (31) 3235-4294
Usina Praça 1º de Maio, 9 | Centro | 35180-018 | Timóteo | MG | Brasil | Tel.: 55 (31) 3849-7000 Fax: 55 (31) 3848-4699
Escritório Comercial Av. Brigadeiro Faria Lima, 1.355 | 20º andar | 01452-919 | São Paulo | SP | Brasil | Tel.: 55 (11) 3818-1700 | Fax: 55 (11) 3816-1812