MACSTEEL®

Data Sheet

STAINLESS STEEL | 304 / 304L TECHNICAL DATA

Description

304 is the most versatile and widely used of all stainless steels. Its chemical composition, mechanical properties, weldability and corrosion/oxidation resistance provide the best all-round performance stainless steel at relatively low cost. It also has excellent low-temperature properties and responds well to hardening by cold working. If the potential for intergranular corrosion in the heat-affected zone exists, 304L is recommended.

Equivalents

304- S30400, EN 1.4031

304L- S30403, EN 1.4307

Typical application

304 is used in many industrial, commercial and domestic fields because of its good corrosion and heat resistance. Some applications include:

- Cookware, sinks, cutlery and catering equipment, food and beverage and pharmaceutical.
- Tanks and containers for a large variety of corrosive liquids, oil and gas, cryogenic.

Chemical composition (EN 10088-2 & ASTM A240)

Grade	%C	%Mn	%Si	%S	%P	%Cr	%Ni
304	0.08	2.0 max	1.0 max	0.03 max	0.045 max	18.0 - 19.5	8.0 - 10.50
304L	0.03					17.5 - 19.5	

Mechanical properties (EN 10088-2 & ASTM A240)

Grade	0.2% proof stress (MPa)	Tensile (MPa)	Elongation (%)	Hardness (HB)
304	210 min	520 - 750	45	201
304L	200 min	500 - 700	45	201

Short time elevated temperature tensile strength (MPa)

Grade	100°C	300°C	500°C	700°C	900°C
304	530	480	400	240	70
304L	480	430	350	200	50

Maximum recommended service temperature

Continuous service: 830°C

Intermitted service: 800°C

Corrosion resistance - Aqueous

Temperature °C	20						80					
Concentration -% by mass	10	20	40	60	80	100	10	20	40	60	80	100
Sulphuric Acid	2	2	2	2	2	2	2	2	2	2	2	2
Nitric Acid	0	0	0	0	2	0	0	0	0	0	1	2
Phosphoric Acid	0	0	0	0	0	2	0	0	0	0	1	0
Formic Acid	0	0	0	0	0	0	0	2	2	2	2	0

Key 0 = resistant - corrosion rate less than 0.1µm/year
Key 1 = partly resistant - corrosion rate 0.1 - 1.0µm/year
Key 2 = non-resistant - corrosion rate more than 1.0µm/year

Corrosion resistance - Atmospheric

The performance of 304 compared with other metals in various environments is shown in the table below – the corrosion rates are based on 10-years exposure.

Environment	Corrosion Rate (µm/year)		
	304	Aluminium-3S	Mild Steel
Rural	0.0025	0.025	5.8
Marine	0.0076	0.432	34.0
Marine-industrial	0.0076	0.686	46.2

Thermal processing

Annealing

Heat to a range between 1010°C to 1120°C and cool rapidly in the air or water. The best corrosion resistance is obtained when the final annealing is above 1070°C and cooling is rapid.

Stress relieving

304L can be stress relieved at 450°C to 600°C for 45 minutes with little danger of sensitisation. A lower stress relieving temperature of 400°C maximum must be used for 304.

Hot-working

Initial forging and pressing: 1150°C to 1260°C

Finishing temperature: 900°C to 925°C

Note: All hot working operations should be followed by annealing.

Cold working

304 / 304L being extremely tough and ductile is readily fabricated by cold working. Typical operations include bending, forming, and deep drawing.

Note: Austenitic stainless steels work harden. Severe cold forming operations should be followed by annealing.

Welding

304/ 304L has good welding characteristics and is suited to all standard welding methods. Either matching or slightly over-alloyed filler wires such as 308L should be used. Weld discolouration should be removed by pickling and passivation to restore maximum corrosion resistance.