Austral Wright Metals
at the cutting edge

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Austral Bronze Crane Copper Limited
ACN 008 466 840

PRODUCT DATA SHEET

Grades 304, 304L, 304H

UNS S30400, S30403, S30409

Stainless Steel

Grade 304 is the most commonly used stainless steel. It is an austenitic, corrosion resistant steel with excellent strength, toughness, fabrication characteristics and weldability. The low carbon version, 304L, may be required for full corrosion resistance when thicker sections are welded. The 304H version has a guaranteed minimum carbon content, which ensures good strength at high temperatures.

Chemical Composition (AS1449 / ASTM A240 – Flat Products)

		Carbon	Silicon	Manganese	Phosphorus	Sulphur	Nickel	Chromium	Nitrogen
304	Specification (max)	0.08	0.75	2.00	0.045	0.030	8.00 – 10.50	18.00 – 20.00	0.10
	Typical	0.045	0.49	1.22	0.028	0.005	8.3	18.2	0.045
304L	Specification (max)	0.03	0.75	2.00	0.045	0.030	8.00 – 12.00	18.00 – 20.00	0.10
	Typical	0.020	0.42	1.46	0.028	0.005	9.1	18.3	0.048
304H	Specification (max)	0.04 – 0.10	0.75	2.00	0.045	0.030	8.00 – 10.50	18.00 – 20.00	–
	Typical	0.049	0.49	1.25	0.028	0.005	8.3	18.3	0.043

Mechanical Properties (AS1449 / ASTM A240 – Flat Products)

		Thickness	0.2% Proof Stress MPa	Tensile Strength MPa	Elongation %	Hardness HB (max)
304	Specification (min)		205	520	40	202
	Typical values	0.3 – 3.5 mm	260	660	55	160
		3.6 – 6 mm	250	600	55	160
		> 6 mm	240	580	55	155
304L	Specification (min)		170	485	40	183
304H	Specification (min)		205	520	40	202

Typical Applications Brewing and dairy equipment, evaporators, drums, barrels, heat exchangers, hospital equipment, refrigeration parts, chemical and food processing, shop fittings, bench tops, kitchens, kitchen utensils, sinks, wash troughs, urinals, hand rails, dishwashers, clothes dryers, ovens, heating trays, air conditioning equipment, guttering and rain water goods, counters and display cabinets, hot and cold food bars, commercial oven hoods, beer barrels.

Description Grade 304 contains 18% chromium, which makes it resistant to many corrosive environments. It is austenitic in structure because of the 8% nickel it contains. The very tough and ductile austenitic structure gives grade 304 excellent formability and fabrication characteristics.

In most applications the steel is used where its corrosion resistance gives long lasting appearance and service life. The ease of cleaning and of maintaining a hygienic surface on the steel make it excellent for many purposes.

The low carbon version, 304L, may be required for full corrosion resistance when sections thicker than about 6mm are welded. The version with guaranteed high carbon, 304H, may be required for elevated temperature service, such as pressure vessels.

Austral Wright Metals can supply this grade as plate, coil, sheet, strip, round, hexagon, flat bar, angles, tube, pipe and welding consumables.

Finishes: No1 (hot rolled, annealed and pickled), 2D (cold rolled), 2B (cold rolled, skin passed), N4 (polished), BA (bright annealed).

Flat products are available surface protected with white polyethylene (PE) film. Protection with blue poly vinyl chloride (PVC) for deep drawing or black PVC (for heavy forming) is also available.

Stainless Steel Grades 304, 304L, 304H

S30400, S30403, S30409

Physical Properties (Typical, annealed)

Property	at	Value	Unit	Property	At	Value	Unit
Density		7,900	Kg/m³	Melting Range		1400-1450	°C
Electrical Conductivity	25°C	1.25	% IACS	Specific Heat		500	J/kg. °C
Electrical Resistivity	25°C	0.72	Micro ohm . m	Relative Magnetic Permeability		1.02	
				Coefficient of Expansion	0 – 100°C	17.2	/ °C
Modulus of Elasticity	20°C	193	GPa		0 – 315°C	17.8	/ °C
Shear Modulus	20°C	77	GPa		0 – 540°C	18.4	/ °C
Poisson's Ratio	20°C	0.30		Thermal Conductivity	100°C	16.2	W / m . °C

Toughness. Austenitic stainless steels are inherently tough, maintaining the ductile fracture mode and high absorbed energy in impact tests to cryogenic temperatures (-200°C).

Pressure Vessels AS1210, Pressure Vessels, allows the use of grade 304 up to a temperature of 800°C. The standard allows the use of higher design stresses at all temperatures for 304H.

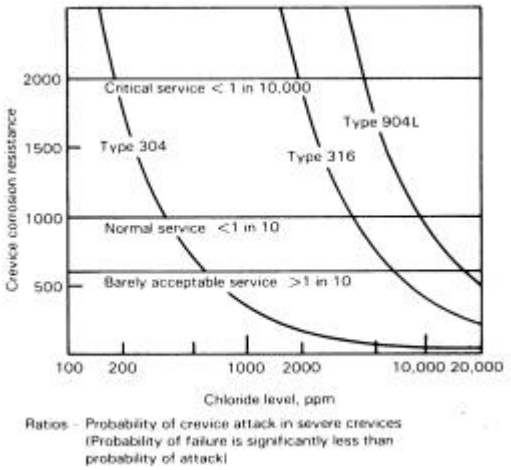
Corrosion Resistance Grade 304 has excellent corrosion resistance in many environments. Austral Wright Metals will be pleased to provide advice for specific applications.

Grade 304 gives good service in atmospheric conditions, resisting most environments except for marine conditions, or where industrial pollution is heavy. Best appearance is maintained where the design allows even rain washing of the surface, or where dirt deposits are occasionally washed off the steel.

Grade 304 has given excellent service in some situations in potable water. Pitting and crevice corrosion may occur at higher chloride content, and 200 ppm is accepted as the upper limit.

Grade 304 is not generally used in seawater, due to the probability of crevice corrosion developing under sediments, precipitation and biofouling.

Grade 304 may suffer stress corrosion cracking in solutions containing chloride ions at temperatures over about 60°C. Stress corrosion cracking should be considered for all corrosion services where the corrosive liquid may contain chloride.



High Temperature Corrosion The generally accepted maximum service temperatures for grade 304 in air are 870°C for intermittent service and 925°C for continuous service.

Cleanability. Grade 304 is often used for food equipment, where cleaning for the removal of bacteria is vital. The cleanability of 304 stainless steel is superior to many other materials.

Cold Fabrication Grade 304 is readily workable, by the standard methods of sheet metal working, with the exception that it cannot be oxygen cut. Plasma cutting is normal. The deep drawing capability of grade 304 is outstanding.

Forging 304 is one of the easier austenitic stainless steels to forge, at temperatures above 925°C.

Machinability Grade 304 is relatively easy to machine, although more difficult than carbon steel. More power is required to machine grade 304. Cutting speed should be lower, the feed higher, tooling and equipment heavier. The machinability of 304 is about 60% that of AISI B1112 resulphurised free cutting carbon steel. A free machining version of 304 is available as bar.

Heat Treatment Solution annealing is performed at 1065 - 1120°C, followed by rapid cooling to prevent the precipitation of the chromium carbides. 304 cannot be hardened by heat treatment. Stress relieving is rarely required due to the high ductility of 304.

Weldability Grade 304 is readily weldable by most fusion techniques (GTAW / TIG, GMAW / MIG / MAG, MMAW / stick, SAW), with no preheat, postheat or control of interpass temperature needed. Welding with the common austenitic filler metals, such as grades 308, 308L, 309, 309L, 316 or 316L (or the silicon containing versions) will retain corrosion resistance and strength. Grades 308 and 308Si are prequalified weld metals to AS1554.6:1994 for welding grade 304 to itself, or to most other austenitic grades.