



## Stainless Steel Bar 304-304L

Colour code: Lilac/Turquoise

### Introduction

Grade 304 is the standard "18/8" stainless. It has excellent forming and welding characteristics.

Grade 304L, the low carbon version of 304, does not require post-weld annealing and so is extensively used in heavy gauge components. The austenitic structure also gives these grades excellent toughness, even down to cryogenic temperatures.

### Related Specifications

Grade	UNS No	British BS	Euronorm		Swedish SS	Japanese JIS
			No	Name		
304	S30400	304S31	1.4301	X5CrNi18-10	2332	SUS 304
304L	S30403	304S11	1.4306	X2CrNi19-11	2352	SUS 304L

These comparisons are approximate only. The list is intended as a comparison of functionally similar materials **not** as a schedule of contractual equivalents. If exact equivalents are needed original specifications must be consulted.

### Chemical Composition

*Specification values in %, according to ASTM A276*

Grade	C	Mn	Si	P	S	Cr	Mo	Ni	N
304	≤0.08	≤2.0	≤1.00	≤0.045	≤0.030	18.0-20.0		8.0-11.0	
304L	≤0.03	≤2.0	≤1.00	≤0.045	≤0.030	18.0-20.0		8.0-12.0	

Atlas304 bar is generally stocked in "Dual Certified" form. These products have chemical and mechanical properties complying with both 304 and 304L specifications. Such dual certified product does not meet 304H specifications and may be unacceptable for high temperature (over about 500°C) applications.

### Conditions of Supply – Specified Mechanical Properties

Values below are specified values according to ASTM A276, condition A, for cold finished 304 bars.

Diameter (mm)	Tensile Strength (MPa) min	0.2% Proof Stress (MPa) min	Elongation (% in 50mm) min	Reduction of Area (%) min
≤12.70	520	310	30	40
>12.70	515	205	30	40

### Conditions of Supply – Typical Physical Properties

Density (kg/m <sup>3</sup> )	Elastic Modulus (GPa)	Mean Coefficient of Thermal Expansion			Thermal Conductivity		Specific Heat 0-100°C (J/kg.K)	Electrical Resistivity (nΩ.m)
		0-100°C (µm/m/°C)	0-315°C (µm/m/°C)	0-538°C (µm/m/°C)	at 100°C (W/m.K)	at 500°C (W/m.K)		
7900	193	17.2	17.8	18.4	16.3	21.5	500	720

## Stainless Steel Bar 304-304L

### Corrosion Resistance

Excellent in a wide range of atmospheric environments and many corrosive media. Subject to pitting and crevice corrosion in warm chloride environments, and to stress corrosion cracking above about 50°C. Considered resistant to potable water with up to about 200mg/L chlorides at ambient temperatures, reducing to about 150mg/L at 60°C. Consult Atlas Technical Assistance for specific environmental recommendations.

### Heat Resistance

Good oxidation resistance in intermittent service to 870°C and in continuous service to 925°C. Continuous use of 304 in the 425-860°C range is not recommended if subsequent aqueous corrosion resistance is important, but 304L and dual certified product 304/304L does not suffer from this problem. For temperatures above 500°C specific high-temperature grades would normally be chosen such as 304H, 321H, 310 or S30815.

### Conditions of Supply – Finish, Dimensions and Tolerances

#### Surface Finish

Round bar up to 25.4mm diameter is all cold drawn. Round bars over 25.4 and up to 127.00mm diameter are smooth-turned and polished. Round bars over 127.00mm diameter are all peeled.

All hexagon bar and all square bar is cold drawn.

#### Diameter and A/F tolerances

Round Bar: Cold drawn h9; Smooth-turned and Polished h10; Peeled up to 160mm k12; Peeled over 160mm +1.5mm/-0; Centreless ground h9 or h8  
Square Bar: h11; Hex Bar: h11.

#### Straightness – maximum deviation from a straight line

Round Bar: 1.5mm in 1500mm and may not exceed: 1.5mm x length in mm / 1500mm

Squares and Hexagon: 1.5mm in 1500mm and may not exceed: 1.5mm x length in mm / 1500mm

Other tolerances may be supplied for more critical applications upon enquiry.

#### Length Tolerance

Sizes up to 25.4mm:	Mill Lengths and Set Lengths, +50mm/-0
Sizes up from 25.4mm to 50.8mm:	Mill Lengths and Set Lengths, +100mm/-0
Sizes over 50.8mm: (varies depending on size)	Mill Lengths and Set Lengths, +/- 300mm

### UGIMA® 304 for top performance in machining

A **UGIMA**® improved machinability version of grade 304 is available in round, hexagon and square bar. **UGIMA**® 304 machines significantly better than standard 304 or 304L, enabling a higher rate of metal removal and lower tool wear in many operations. Surface quality and reliability of machining results will improve too when using **UGIMA**® 304. For **UGIMA**® 304 detailed set-up table are available on request, specifying machining parameters (surface speed, feed rate, depth of cut and type of tool) for high-speed steel tooling and carbide insert tooling for the most common machining operations (roughing, finishing, drilling, parting-off etc.). Machinability assistance is available for optimal set-up and problem-solving for specific machining jobs.

# Atlas Specialty Metals

## Stainless Steel Bar 304-304L

### Heat Treatment

The following temperature ranges are applicable for the respective heat treatment operations.

Forging	Annealing
900 – 1200°C	1010 – 1120°C

Cool rapidly after annealing. Atlas304 cannot be hardened by thermal treatment.

### Welding

Excellent weldability by all standard fusion methods, both with and without filler metals. AS 1554.6 pre-qualifies welding of 304 with Grade 308 and 304L with 308L rods or electrodes (and with their high silicon equivalents). Heavy welded sections in Grade 304 may require post-weld annealing for maximum corrosion resistance. This is not required for Grade 304L.

### Applications of Atlas 304

Food processing equipment, particularly in beer brewing, milk processing & wine making. Kitchen appliances and equipment. Heat exchanger components. Threaded fasteners. Springs.

### Possible Alternative Grades

Grade	Why it may be chosen instead of 304/L
304Cu	Lower work hardening rate is needed for cold forging of screws, bolts and rivets. Higher machinability than 304/L.
303	Higher machinability needed, and the lower corrosion resistance, formability and weldability are acceptable.
316	Higher resistance to pitting and crevice corrosion is required, in chloride environments.
430	A lower cost is required, and the reduced corrosion resistance and fabrication characteristics are acceptable.

#### Disclaimer

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