



Detectamet Ltd
Unit 55 Halifax Way
Pocklington Industrial Estate
YORK. YO42 1NR
Tel: +44 (0) 1759 304200
Fax: +44 (0) 1759 305236
E-mail: sales@detectamet.com
Web: www.detectamet.co.uk

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. Grade 321 may also be used as an alternative to 304 if heavy section welding is required and post-weld heat treatment is not possible.

Machining

A "Ugima" improved machinability version of grade 304 is available in bar products. "Ugima" machines significantly better than standard 304 or 304L, giving higher machining rates and lower tool wear in many operations.

Dual Certification

It is common for 304 and 304L to be stocked in "Dual Certified" form, particularly in plate and pipe. These items 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 applications.

Applications

Typical applications include:

Food processing equipment, particularly in beer brewing, milk processing & wine making.

Kitchen benches, sinks, troughs, equipment and appliances

Architectural panelling, railings & trim

Chemical containers, including for transport

Heat Exchangers

Woven or welded screens for mining, quarrying & water filtration

Threaded fasteners

Springs

Company Registration No: 5103699 - VAT Registration No: GB 842 4113 57
Head Office Address: Unit 55 Halifax Way, Pocklington Industrial Estate, York YO42 1NR





Detectamet Ltd
 Unit 55 Halifax Way
 Pocklington Industrial Estate
 YORK. YO42 1NR
 Tel: +44 (0) 1759 304200
 Fax: +44 (0) 1759 305236
 E-mail: sales@detectamet.com
 Web: www.detectamet.co.uk

Source: Atlas Steels Australia

Old British Euronorm

Grade UNS No
 BS En No Name
 Swedish
 SS
 Japanese
 JIS

304	S30400	304S31	58E	1.4301	X5CrNi18-10	2332	SUS 304
304L	S30403	304S11	-	1.4306	X2CrNi19-11	2352	SUS 304L
304H	S30409	304S51	-	1.4948	X6CrNi18-11	-	-

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.

Possible Alternative Grades

Possible alternative grades to grade 304 stainless steels are given in table 5.

Table 5. Possible alternative grades to 304 grade stainless steel

301L	A higher work hardening rate grade is required for certain roll formed or stretch formed components.
302HQ	Lower work hardening rate is needed for cold forging of screws, bolts and rivets.
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
321	Better resistance to temperatures of around 600-900°C is needed...321 has higher hot strength.
3CR12	A lower cost is required, and the reduced corrosion resistance and resulting discolouration are acceptable.
430	A lower cost is required, and the reduced corrosion resistance and fabrication characteristics are acceptable.

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 60°C. Considered resistant to potable water with up to about 200mg/L chlorides at ambient temperatures, reducing to about 150mg/L at 60°C.

Heat Resistance

Company Registration No: 5103699 - VAT Registration No: GB 842 4113 57
 Head Office Address: Unit 55 Halifax Way, Pocklington Industrial Estate, York YO42 1NR





Detectamet Ltd
 Unit 55 Halifax Way
 Pocklington Industrial Estate
 YORK. YO42 1NR
 Tel: +44 (0) 1759 304200
 Fax: +44 (0) 1759 305236
 E-mail: sales@detectamet.com
 Web: www.detectamet.co.uk

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. Grade 304L is more resistant to carbide precipitation and can be heated into the above temperature range.

Grade 304H has higher strength at elevated temperatures so is often used for structural and pressure-containing applications at temperatures above about 500°C and up to about 800°C. 304H will become sensitised in the temperature range of 425-860°C; this is not a problem for high temperature applications, but will result in reduced aqueous corrosion resistance.

Heat Treatment

products such as pipe and bar in their respective specifications.

Composition

Typical compositional ranges for grade 304 stainless steels are given in table 1.

Table 1. Composition ranges for 304 grade stainless steel

Grade	C	Mn	Si	P	S	Cr	Mo	Ni	N	304
304	Min.	-	-	-	-	-	-	18.0	-	8.0
	Max.	0.08	2.0	0.75	0.045	0.030	-	20.0	-	10.5
304L	Min.	-	-	-	-	-	-	18.0	-	8.0
	Max.	0.030	2.0	0.75	0.045	0.030	-	20.0	-	12.0
304H	Min.	0.04	-	-	-	-	-	18.0	-	8.0
	Max.	0.10	2.0	0.75	0.045	0.030	-	20.0	-	10.5

Mechanical Properties

Typical mechanical properties for grade 304 stainless steels are given in table 2.

Table 2. Mechanical properties of 304 grade stainless steel

Hardness	Grade	Tensile Strength (MPa) min	Yield Strength 0.2% Proof (MPa) min	Elongation (%)
----------	-------	----------------------------	-------------------------------------	----------------

Company Registration No: 5103699 - VAT Registration No: GB 842 4113 57
 Head Office Address: Unit 55 Halifax Way, Pocklington Industrial Estate, York YO42 1NR





Detectamet Ltd
 Unit 55 Halifax Way
 Pocklington Industrial Estate
 YORK. YO42 1NR
 Tel: +44 (0) 1759 304200
 Fax: +44 (0) 1759 305236
 E-mail: sales@detectamet.com
 Web: www.detectamet.co.uk

in 50mm) min	Rockwell B(HR B) max	Brinell (HB)max			
304	515	205	40	92	201
304L	485	170	40	92	201
304H	515	205	40	92	201

304H also has a requirement for a grain size of ASTM No 7 or coarser.

Physical Properties

Typical physical properties for annealed grade 304 stainless steels are given in table 3.

Table 3. Physical properties of 304 grade stainless steel in the annealed condition

	Mean Coefficient of Thermal Expansion (1/m/m/°C)	Thermal Conductivity (W/m.K)	Grade	Density (kg/m³)					
Elastic Modulus (GPa)	0-100°C	0-315°C	0-538°C at 100°C	at 500°C					
Specific Heat 0- 100°C (J/kg.K)	Electrical Resistivity (n.m)								
304/L/H	8000	193	17.2	17.8	18.4	16.2	21.5	500	720

Grade Specification Comparison

Approximate grade comparisons for 304 stainless steels are given in table 4.

Table 4. Grade specifications for 304 grade stainless steel

Stainless Steel - Grade 304

Chemical Formula

Fe, <0.08% C, 17.5-20% Cr, 8-11% Ni, <2% Mn, <1% Si, <0.045% P, <0.03% S

Topics Covered

Background

Key Properties

Composition

Mechanical Properties

Physical Properties

Grade Specification Comparison

Possible Alternative Grades

Corrosion Resistance

Heat Resistance

Company Registration No: 5103699 - VAT Registration No: GB 842 4113 57
 Head Office Address: Unit 55 Halifax Way, Pocklington Industrial Estate, York YO42 1NR





Detectamet Ltd
Unit 55 Halifax Way
Pocklington Industrial Estate
YORK. YO42 1NR
Tel: +44 (0) 1759 304200
Fax: +44 (0) 1759 305236
E-mail: sales@detectamet.com
Web: www.detectamet.co.uk

Heat Treatment

Welding

Machining

Dual Certification

Applications

Background

Grade 304 is the standard "18/8" stainless; it is the most versatile and most widely used stainless steel, available in a wider range of products, forms and finishes than any other. It has excellent forming and welding characteristics. The balanced austenitic structure of Grade 304 enables it to be severely deep drawn without intermediate annealing, which has made this grade dominant in the manufacture of drawn stainless parts such as sinks, hollow-ware and saucepans. For these applications it is common to use special "304DDQ" (Deep Drawing Quality) variants. Grade 304 is readily brake or roll formed into a variety of components for applications in the industrial, architectural, and transportation fields. Grade 304 also has outstanding welding characteristics. Post-weld annealing is not required when welding thin sections.

Grade 304L, the low carbon version of 304, does not require post-weld annealing and so is extensively used in heavy gauge components (over about 6mm). Grade 304H with its higher carbon content finds application at elevated temperatures. The austenitic structure also gives these grades excellent toughness, even down to cryogenic temperatures.

Key Properties

These properties are specified for flat rolled product (plate, sheet and coil) in ASTM A240/A240M. Similar but not necessarily identical properties are specified for other

Company Registration No: 5103699 - VAT Registration No: GB 842 4113 57
Head Office Address: Unit 55 Halifax Way, Pocklington Industrial Estate, York YO42 1NR

