BRODER METALS GROUP High Tensile Stainless 304

Broder Metals supply cold drawn 304 and 304L in **A2-70, A2-80, B8 Class 2** and **B8 Class 2B.**

A2-70 and **A2-80** are named by their minimum tensile strength to be met by the material (70 & 80) by the bolt, screw or nut after manufacture.

In ASTM A193/A193M -11, austenitic steels are divided into 6 classes (1, 1A, 1B and 2, 2B and 2C) and 27 grades (B8, B8A, BBC, BBCA, B8M, B8MA, B8M2, B8M3, BBP, B8PA, B8N, B8NA, B8MN, B8M-NA, B8MNLCuN, B8MLCuNA, B8T, B8TA, B8R, B8RA, B8S, B8SA, B8LN, B8LBNA, B8MLN, and B8MLN, and B8LNA).

Stock

A2-70 We stock round bar from 10 mm to 60 mm diameter, and hexagons from 10 mm to 37 mm AF.

A2-80 We stock round bar from 10 mm to 60 mm diameter, and hexagons from 10 mm to 37 mm AF.

B8 Class 2 & B8 Class 2B We stock round bar from 10 mm to 75 mm diameter, and hexagons from 10 mm to 60 mm AF.

We can also produce flats and squares not covered by the standard, on request, to reduce machining costs (up to 101.6 mm [4”] square and flats to 100 mm x 50 mm [4” x 2”]). Please enquire detailing the properties required.

Background

Grade 304 is the standard "18/8" stainless; it is the most versatile and most widely used stainless steel. It has excellent forming and welding characteristics. The balanced austenitic structure of Grade 304 enables it to be severely deep drawn without intermediate annealing, Grade 304 also has outstanding 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 (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.

Good oxidation resistance in temperatures up to 870°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. 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.

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Grade 304 is excellent in a wide range of atmospheric environments and many corrosive media, although it is subject to pitting and crevice corrosion in warm chloride environments, and to stress corrosion cracking above about 60°C. Grade 304 is considered resistant to potable water with up to about 200mg/L chlorides at ambient temperatures, reducing to about 150mg/L at 60°C.
The austenitic structure also gives these grades excellent toughness, even down to cryogenic temperatures. Heat Treatment is by solution annealing - heated to 1010-1120°C and cooled rapidly. These grades cannot be hardened by thermal treatment. Cold working (normally drawing) produces enhanced levels of tensile strength. All austenitic stainless steel fasteners are normally non-magnetic in the annealed condition. It is common for 304 grades to be stocked in "Dual Certified" form. These items have chemical and mechanical properties complying with both 304 and 304L specifications.

Physical Properties—in Annealed condition

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

A2-80 Chemical Composition

Grade		C	Mn	P	S	Si	Cr	Ni	Cu
A2-80	**Min**	-	-	-	-	-	15.0	8.0	-
	Max	0.1	2.00	0.05	0.03	1.00	20.0	19.0	4.0
304	**Min**	-	-	-	-	-	18.0	8.0	-
	Max	0.08	2.0	0.045	0.03	0.75	20.0	10.5	-
304L	**Min**	-	-	-	-	-	20.0	12.0	-
	Max	0.03	2.0	0.045	0.03	0.75	18.0	8.0	-
304H	**Min**	0.04	-	-	-	-	18.0	8.0	-
	Max	0.10	0.20	0.045	0.03	0.75	20.0	10.5	-

A2-80 Chemical Composition notes: If the chromium content is below 17%, the minimum nickel content should be 12%. if the carbon content is a maximum of 0.03%, nitrogen may be present to a maximum of 0.2%

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A2-70 Chemical Composition

See table below for A2-70 material chemical composition (standard chemical compositions for a range of 304 stainless steels is also given for information).

Grade		C	Mn	P	S	Si	Cr	Ni	Cu
A2-70	**Min**	-	-	-	-	-	15.0	8.0	-
	Max	0.1	2.00	0.05	0.03	1.00	20.0	19.0	4.0
304	**Min**	-	-	-	-	-	18.0	8.0	-
	Max	0.08	2.0	0.045	0.03	0.75	20.0	10.5	-
304L	**Min**	-	-	-	-	-	20.0	12.0	-
	Max	0.03	2.0	0.045	0.03	0.75	18.0	8.0	-
304H	**Min**	0.04	-	-	-	-	18.0	8.0	-
	Max	0.10	0.20	0.045	0.03	0.75	20.0	10.5	-

A2-70 Chemical Composition notes:

1. If the chromium content is below 17%, the minimum nickel content should be 12%
2. if the carbon content is a maximum of 0.03%, nitrogen may be present to a maximum of 0.2%

B8 Class 2 Chemical Composition

See table below for B8 Class 2 material chemical composition (standard chemical compositions for a range of 304 stainless steels is also given for information).

Grade		C	Mn	P	S	Si	Cr	Ni
B8	**Min**	-	-	-	-	-	18.0	8.0
	Max	0.8	2.00	0.045	0.03	1.0	20.0	11.0
304	**Min**	-	-	-	-	-	18.0	8.0
	Max	0.08	2.0	0.045	0.03	0.75	20.0	10.5
304L	**Min**	-	-	-	-	-	20.0	12.0
	Max	0.03	2.0	0.045	0.03	0.75	18.0	8.0
304H	**Min**	0.04	-	-	-	-	18.0	8.0
	Max	0.10	0.20	0.045	0.03	0.75	20.0	10.5

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A4-70 & A4-80 Mechanical Properties

Note: the standard allows that, for diameters over 1.1/2" (38.1 mm), centre (core) properties may be lower than indicated by test results which are based on values determined at ½ radius.

Grade	Tensile Strength (MPa) min	Yield Strength 0.2% Proof (Mpa) min	Elongation (% in 4D min)	Reduction of area (%)	Hardness (HRC max)
A4-70	700	450	40	Not required	Not required
A4-80	800	600	30	Not required	Not required
304	515	205	40	55	15
304L	485	170	40	55	15
304H	515	205	40	55	15

B8 Class 2 & B8 Class 2B Mechanical Properties

Grade	Size Dia (mm)	Tensile Strength (MPa) min	Yield strength 0.2% proof (MPa) min	Elongation (% in 4D min)	Red of area (% min)	Hardness (HRC max)
B8M CL2	<=19.05	860	690	12	35	35
B8M CL2	>19.05 <=31.75	795	550	15	35	35
B8M CL2	>25.4 <=31.75	725	450	20	35	35
B8M CL2	>31.75 <38.1	690	345	28	45	35
B8M CL2B	>38.1 <=50.8	655	515	25	40	35
B8M CL2B	>50.8 <=63.5	620	450	30	40	35
B8M CL2B	>63.5 <=76.2	550	380	30	40	35

On request we can produce material with a tensile strength of over 1000 MPa (suitable after head forging to stress relieve and still achieve above 800 MPa).

304 is just one of a range of high tensile steels stocked by Broder Metals Group Ltd – please see our website for the full range stocked: www.broder-metals-group.com

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