

SALOMON'S METALEN B.V.

303

Grade 303 represents the optimum in machinability among the austenitic stainless steels. It is primarily used when production involves extensive machining in automatic screw machines. Machinability Rating (compared to B1212) is approximately 78%. As for other austenitic grades the structure gives 303 excellent toughness, although the sulphur in 303 reduces its toughness slightly.

Corrosion Resistance

Good resistance to mildly corrosive atmospheres, but significantly less than Grade 304 due to the sulphur addition; the sulphide inclusions act as pit initiation sites. Grade 303 should not be exposed to marine or other similar environments, as these will result in rapid pitting corrosion. Because the sulphide inclusions in 303 are primarily aligned along the rolling direction the corrosion resistance is particularly reduced in cross-sections.

Grade 303, like other common austenitic stainless steels, is subject to stress corrosion cracking in chloride containing environments above about 50°C.

Heat Resistance

Good oxidation resistance in intermittent service to 760°C and in continuous service to 870°C. Continuous use in the 425-860°C range is not usually recommended due to carbide precipitation - 303 usually does not have a low carbon content so is susceptible to sensitisation, which can lead to intergranular corrosion.

Fabrication

As well as reducing the corrosion resistance, the sulphur additions in 303 also result in poor weldability and reduced formability compared to Grade 304. Sharp bends should not be attempted in 303.

Heat Treatment

- **Solution Treatment (Annealing)**

Heat to 1010-1120°C and cool rapidly. This grade cannot be hardened by thermal treatment.

Welding

Not generally recommended but, if unavoidable use Grade 308L or 309 electrodes. AS 1554.6 does not pre-qualify welding of 303. Welds must be annealed for maximum corrosion resistance, but even then poor mechanical and corrosion properties will result.

Typical Applications

Nuts and bolts. Bushings. Shafts. Electrical switchgear components. Gears. In general any component that is heavily machined and where the corrosion resistance and fabrication properties of 303 are viable.

Specified Properties

These properties are specified for long product (bar) in ASTM A582M. Similar but not necessarily identical properties are specified for other products such as wire and forgings in their respective specifications. Grade 303 is not produced in flat rolled products.

Limitation of Liability

The information contained in this datasheet is not an exhaustive statement of all relevant information. It is a general guide for customers to the products and services available from Salomon's Metalen B.V. and no representation is made or warranty given in relation to this document or the products or processes it describes.

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Composition Specification (%)

Grade		C	Mn	Si	P	S	Cr	Mo	Ni	Se
303	min. max.	- 0.15	- 2.00	- 1.00	- 0.20	0.15 -	17.0 19.0	-	8.0 10.0	-

Mechanical Property Specification

Grade	Tensile Strength (MPa)	Yield Strength 0.2% Proof (MPa)	Elongation (% in 50mm)	Hardness	
				Rockwell B (HR B)	Brinell (HB)
303	650 typical	300 typical	45 typical	-	262 max

Note that ASTM A582 only specifies hardness – tensile properties included above are not guaranteed and for information only. Drawn bars, generally up to 25.4mm diameter, will have higher strength values. Proof (yield) stress values in particular will be significantly higher and the percentage elongation lower.

Physical Properties (typical values in the annealed condition)

Grade	Density (kg/m ³)	Elastic Modulus (GPa)	Mean Coefficient of Thermal Expansion			Thermal Conductivity		Specific Heat	Electrical Resistivity
			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)	0-100°C (J/kg.K)	(nΩ.m)
303	7900	193	17.3	17.8	18.4	16.3	21.5	500	720

Grade Specification Comparison

Grade	UNS	Euronorm		Swedish	Japanese
	No	No	Name	SS	JIS
303	S30300	1.4305	X8CrNiS18-9	2346	SUS 303

Possible Alternative Grades

Grade	Why it might be chosen instead of 303
304	Better corrosion resistance, formability or weldability are needed, at the expense of lower machinability. Consider 304 Ugima.
316	Higher resistance to pitting and crevice corrosion is required, in chloride environments. A lower machinability can be accepted.
416	Even higher machinability than 303 is needed, and a lower corrosion resistance can be tolerated. Or hardening by thermal treatment is required, while maintaining a high machinability.

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