

SS 303, Type 303, WNR 1.4305, UNS S30300, AISI 303, Grade 303, AFNOR Z 10 CNF 18-09

Introduction :

Among the austenitic stainless steels 303 grade represents the optimum in machinability. It is primarily used once production involves intensive machining in automatic screw machines. 303 stainless steel provides Good resistance to mildly corrosive atmospheres, but significantly less than stainless steel 304 due to the sulphur addition; the sulphide inclusions act as pit initiation sites. Due rapid pitting corrosion Grade 303 shouldn't be exposed to marine or different similar environments. Grade 303 is subject to stress corrosion cracking in chloride containing environments above about 60°C, like other common austenitic stainless steels. In intermittent service to 760°C and in continuous service to 870°C it provides good oxidation resistance. Due to carbide precipitation continuous use in 425-860°C range not usually recommended. 303 grade is susceptible to sensitisation because it does not have a low carbon content. Compared to Grade 304 the sulphur additions in Grade 303 result in poor weldability and reduced formability as well as reducing the corrosion resistance. Welding is not generally recommended for stainless steel 303 material but, if unavoidable and a lower strength can be tolerated, by using stainless steel 308L or 309 electrodes.

Chemical Composition

	SS 303	TYPE 303	WNR 1.4305	UNS S30300	AISI 303	GRADE 303	AFNOR Z10 CNF 18-09
Carbon	0.15 max	0.15 max	0.15 max	0.15 max	0.15 max	0.15 max	0.15 max
Manganese	2.00 max	2.00 max	2.00 max	2.00 max	2.00 max	2.00 max	2.00 max
Phosphorus	0.20 max	0.20 max	0.20 max	0.20 max	0.20 max	0.20 max	0.20 max
Sulfur	0.15 min	0.15 min	0.15 min	0.15 min	0.15 min	0.15 min	0.15 min
Silicon	1.00 max	1.00 max	1.00 max	1.00 max	1.00 max	1.00 max	1.00 max
Chromium	17.0-19.0	17.0-19.0	17.0-19.0	17.0-19.0	17.0-19.0	17.0-19.0	17.0-19.0
Nickel	8.0-10.0	8.0-10.0	8.0-10.0	8.0-10.0	8.0-10.0	8.0-10.0	8.0-10.0

Mechanical Properties

	SS 303	TYPE 303	WNR 1.4305	UNS S30300	AISI 303	GRADE 303	AFNOR Z10 CNF 18-09
Tensile Strength, ksi [Mpa]	90[620]	90[620]	90[620]	90[620]	90[620]	90[620]	90[620]
Yield Strength, ksi[Mpa]	45[310]	45[310]	45[310]	45[310]	45[310]	45[310]	45[310]
Elongation %	30	30	30	30	30	30	30
Reduction in Area, %	40	40	40	40	40	40	40
Hardness, HB	170	170	170	170	170	170	170

Standard Available in forms :

- ASTM A182/ ASME SA182 Stainless Steel Pipe Fittings
- ASTM A213 / ASME SA213 Seamless Stainless Steel Pipes
- ASTM A240/ ASME SA240 Stainless Steels Sheets / Plates
- ASTM A249/ ASME SA249 Stainless Steel Welded Tubes
- ASTM A269/ ASME SA269 Stainless Steel Tubes
- ASTM A270/ ASME SA270 Stainless Steel Sanitary Tubes
- ASTM A312/ ASME SA312 Stainless Steel Pipes
- ASTM A403/ ASME SA403 Stainless Steel Pipe Fittings
- ASTM A554/ ASME SA554 Stainless Steel Welded Tubes
- ASTM A731/ ASME SA731 Stainless Steel Pipes
- ASTM A789/ ASME SA789 Stainless Steel Tubes
- ASTM A790/ ASME SA790 Stainless Steel Pipes
- ASTM A791/ ASME SA791 Stainless Steel Tubes

Products Available in forms :

- SS 303, Type 303, WNR 1.4305, UNS S30300, AISI 303 Plates
- SS 303, Type 303, WNR 1.4305, UNS S30300, AISI 303 Pipes
- SS 303, Type 303, WNR 1.4305, UNS S30300, AISI 303 Round Bar
- SS 303, Type 303, WNR 1.4305, UNS S30300, AISI 303 Tube
- SS 303, Type 303, WNR 1.4305, UNS S30300, AISI 303 Flanges
- SS 303, Type 303, WNR 1.4305, UNS S30300, AISI 303 Wire
- SS 303, Type 303, WNR 1.4305, UNS S30300, AISI 303 Fittings

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 60°C.

Heat Resistance

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

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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.
- A practical compromise alternative may be a 304 Ugima Improved Machinability grade - this does not machine as readily as 303, but does offer better formability (as well as better weldability and corrosion resistance).

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 and a lower strength can be tolerated, use Grade 308L or 309 electrodes.
- AS 1554.6 does not pre-qualify welding of 303. Welds must be annealed for maximum corrosion resistance.

Machining

- A "Ugima" improved machinability version of grade 303 is available in round bar products.
- This machines significantly better even than standard 303, giving very high machining rates and lower tool wear in many operations.

Annealing

- Type 303 should be heated to 1900°F minimum and water quenched or rapidly cooled by other means.

Hardening

- Type 303 cannot be hardened by heat treatment

Cold Working

- The cold formability of Type 303 is reduced by its high sulfur content.
- Bending with a generous bend radius may be considered for Type 303.
- When cold forming is required, Type 304 should be considered.

Hot Working

- The high sulfur content, added for machinability, is detrimental to hot workability.
- If hot forming is necessary, an alternate grade such as Type 304 should be considered.
- When forging is necessary, it should be done in the 1800-2200°F range, and should be followed by annealing at 1900°F minimum and water quenching or rapid cooling by other means

Applications

- Nuts and Bolts
- Bushings
- Shafts
- Aircraft Fittings
- Electrical Switchgear Components
- Gears
- In general any component that is heavily machined and where the corrosion resistance and fabrication properties of 303 are viable.



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