

Stainless Steel: 1.4305 (303) Bar

Description

Stainless steel type 1.4305 is commonly referred to as grade 303 stainless steel. Among the austenitic grades of stainless steel, grade 303 is recognized for its exceptional machinability. This attribute is attributed to the presence of Sulphur in the steel composition. While Sulphur enhances machinability, it concurrently leads to a reduction in corrosion resistance and a slight decrease in toughness. The corrosion resistance of type 303 is not as high as that of 304. Nevertheless, the toughness remains excellent, consistent with other austenitic grades.

The provided property data in this document pertains to bar products specified by EN 10088-3:2005. ASTM or other standards may cover the products sold. It is reasonable to anticipate that specifications in these standards will be similar but not necessarily identical to those outlined in this datasheet.

Alloy Designations

Stainless Steel Grade 1.4305/303 corresponds to the following designations but may not be a direct equivalent:

- UNS S30300
- BS 303S31
- EN 58M

Supplied Forms

This is a machining bar specification, typically supplied as round and hexagon.

- Bar

Applications

Grade 303 is used in applications that require parts to be heavily machined. These applications include:

- Nuts and bolts
- Screws
- Gears
- Aircraft fittings
- Bushings
- Shafts

Corrosion Resistance

Sulphur additions to the composition act as initiation sites for pitting corrosion, decreasing the corrosion resistance of 303 stainless steel compared to 304. However, corrosion resistance remains good in mild environments. In chloride-containing environments over 60°C, 303 stainless steel is subject to pitting and

crevice corrosion. Grade 303 stainless is not suitable for use in marine environments.

Heat Resistance

Grade 303 stainless steel has good resistance to oxidation when intermittently exposed to temperatures up to 760°C. It also has good oxidation resistance in continuous service up to 870°C. However, continuous use at 425-860°C is not recommended, as 303 is sensitive to carbide precipitation.

Fabrication

Fabrication of all stainless steels should be done only with tools dedicated to stainless steel materials. Tooling and work surfaces must be thoroughly cleaned before use to avoid cross-contamination.

Cold Working

Type 303 is not readily cold workable. Some cold working is possible, but sharp bending should not be attempted.

Hot Working

Fabrication methods, like forging, that involve hot working should occur after uniform heating to 1149-1260°C. The fabricated components should then be rapidly cooled to ensure maximum corrosion resistance.

Machinability

Grade 303 stainless steel has excellent machinability. Machining can be enhanced by adhering to the following rules:

- Cutting edges must be kept sharp.
- Cuts should be light but deep enough to prevent work hardening.
- Chip breakers should be employed to assist in ensuring swarf remains clear of the work.
- Low thermal conductivity of austenitic alloys means coolants and lubricants are necessary and must be used in large quantities.

Heat Treatment

Grade 303 stainless steel cannot be hardened by heat treatment. Solution treatment or annealing can be done by rapid cooling after heating to 1010-1120°C.

Weldability

The sulfur addition present in 303 stainless steel results in poor weldability. If 303 must be welded, the recommended filler rods or electrodes are grades 308L and 309 stainless steels. For maximum corrosion resistance, the welds must be annealed.

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Chemical Composition

EN 10088-3:2005. 1.4305 Steel

Element	% Present
Chromium (Cr)	17.00 - 19.00
Nickel (Ni)	8.00 - 10.00
Manganese (Mn)	0.0 - 2.00
Copper (Cu)	0.0 - 1.00
Silicon (Si)	0.0 - 1.00
Sulphur (S)	0.15 - 0.35
Nitrogen (N)	0.0 - 0.11
Carbon (C)	0.0 - 0.10
Phosphorous (P)	0.0 - 0.05
Iron (Fe)	Balance

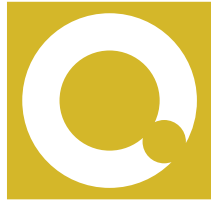
Physical Properties

Property	Value
Density	8.03 g/cm ³
Melting Point	1455 °C
Thermal Expansion	17.3 x10 ⁻⁶ /K
Modulus of Elasticity	193 GPa
Thermal Conductivity	16.3 W/m.K
Electrical Resistivity	0.72 x10 ⁻⁶ Ω .m

Mechanical Properties

EN 10088-3:2005. Bar. Up to 160mm Dia / Thickness

Property	Value
Proof Stress	190 Min MPa
Tensile Strength	500 to 700 MPa
Elongation A50 mm	35 Min %
Hardness Brinell	230 Max HB



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Disclaimer

This data serves as an indicative reference and should not be used as a substitute for the full specification. Mechanical properties can vary significantly depending on the temper, product, and its dimensions. All the information provided is based on our current knowledge and is given in good faith. The company bears no responsibility for any actions taken by third parties based on this information.

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While the material supplied by the company may vary from the data presented here, it will conform to all relevant and applicable standards.

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