



Stainless Steel 1.4305 - 303

Material Data Sheet

Stainless steel type 1.4305 is popularly known as grade 303 stainless steel. Grade 303 is the most readily machinable of all the austenitic grades of stainless steel. The machinable nature of grade 303 is due to the presence of Sulphur in the steel composition. Whilst the Sulphur improves machining, it also causes a decrease in the corrosion resistance and a slight lowering of the toughness. The corrosion resistance of type 303 is lower than that for 304. The toughness is still excellent as with other austenitic grades. It is reasonable to expect specifications in this data sheet to be similar but not necessarily identical to those given in this data sheet.

Application

- Shafts
- Springs
- Nuts & bolts
- Gears
- Aircraft fittings
- Bushings

Supplied Forms

- Bar

Alloy Designations

Stainless steel grade 1.4305/303 also corresponds to: UNS S30300, BS 303S31 and EN 58M.

Corrosion Resistance

Sulphur additions to the composition act as initiation sites for pitting corrosion. This decreases the corrosion resistance of 303 stainless steel to less than that for 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

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 to 870°C. This however, is not recommended as 303 is sensitive to carbide precipitation with continuous use at 425-860°C.

Fabrication

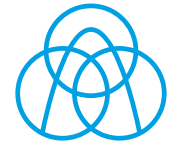
Fabrication of all stainless steels should be done only with tools dedicated to stainless steel materials. Tooling and work surfaces must be thoroughly cleaned before use. These precautions are necessary to avoid cross contamination of stainless steel by easily corroded metals that may discolour the surface of the fabricated product.

Cold Working

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

303 stainless steel has excellent machinability. Machining can be enhanced by adhering to the following rules: Cutting edges must be kept sharp. Dull edges cause excess work hardening. Cuts should be light but deep enough to prevent work hardening by riding on the surface of the metal. Chip breakers should be employed to assist in ensuring swarf remains clear of the work. Low thermal conductivity of austenitic alloys results in heat concentrating at the cutting edges. This means coolants and lubricants are necessary and must be used in large quantities.

Heat Treatment

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 sulphur 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.

Chemical Composition^{a)}

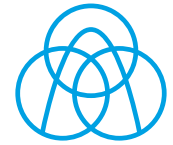
Element	% Present
Carbon (C)	0.10
Chromium (Cr)	17.00 - 19.00
Manganese (Mn)	2.00
Silicon (Si)	1.00
Phosphorous (P)	0.045
Sulphur (S)	0.015 - 0.35
Nickel (Ni)	8.00 - 10.00
Iron (Fe)	Balance
Nitrogen (N)	0.10
Copper (Cu)	1.00

^{a)} Maximum values unless otherwise stated.

Mechanical Properties

Property	Value
Comprehensive Strength	190 MPa
Tensile Strength	500 to 700 MPa
Elongation	35 Min %

Properties above are for 1.4305



Physical Properties

Property	Value
Density	8.03 Kg/m ³
Melting Point	1455 °C
Thermal Expansion	17.2 x 10 ⁻⁶ /K
Modulus of Elasticity	193 GPa
Thermal Conductivity	16.3 W/m.K
Electrical Resistivity	0.072x 10 ⁻⁶ Ω .m

Editor

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Important Note

Information given in this data sheet about the condition or usability of materials respectively products are no warranty for their properties, but act as a description.

The information, we give on for advice, comply to the experiences of the manufacturer as well as our own. We cannot give warranty for the results of processing and application of the products.