

PRODEC® Type 303 UNS S30300



The best free machining austenitic stainless steel.

Description

PRODEC® 303 is a fully resulfurized free-machining austenitic stainless steel. The PRODEC brand name means this steel has been specially melted and treated by Outokumpu's proprietary ladle metal-lurgy techniques to maximize machinability while retaining good mechanical properties, corrosion resistance, and forming characteristics.

PRODEC 303 is generally considered to be a non-magnetic stainless steel in the annealed condition but it may show faint magnetic response as a result of cold working.

Specifications

PRODEC 303 stainless steel bar meets ASTM A 314, A 320/A 320M, A 581/A 581M, and A 582/A 582M, and AMS 5640 specifications.

Product Forms Available

Bar (round, hex, and square)
Billet
Plate

Corrosion Resistance

Standard Type 303 is resistant to mildly corrosive environments but is less resistant than Type 304 stainless steel because of its high sulfur content. For the same reason, PRODEC 303 is not as corrosion resistant as Type 304. The PRODEC process controls the amount, composition, size, and shape of the sulfides in a way that reduces the loss of corrosion resistance normally associated with the sulfides. For best corrosion resistance, all 303 parts should be chemically treated to remove the sulfides from the final surface of the part.

PRODEC 303 Machining Parameters

Table 1

	High speed tooling		Carbide tooling		Depth/Width (dia/in)
	Speed (sfm)	Feed (in/rev)	Speed (sfm)	Feed (in/rev)	
Turning	115-130	0.015-0.020	375-700	0.025-0.030	0.005-0.200
	135-180	0.005-0.010	600-900	0.007-0.010	0.002-0.004
Cut-Off	90-120	0.0015-0.0020	275-400	0.002-0.004	1/16
	100-130	0.0025-0.0030	325-450	0.004-0.008	1/4
Forming	100-130	0.0020	375-425	0.003-0.006	1
	90-120	0.0015	350-400	0.002-0.004	2
Drilling	70-80	0.007	—	—	1/4
	85-95	0.012	700	0.005	1/2
	100-110	0.020	800	0.007	1-2
Reaming	90-110	0.006	—	—	1/4
	90-110	0.025	—	—	1-2
End Milling	130-160	0.003	300-450	0.004	0.050 -1/2
	130-160	0.006	360-500	0.008	0.050 -1/2
Tapping + Threading	10-115	—	—	—	7 threads/in
	40-50	—	—	—	25 threads/in

Machinability

PRODEC 303 is easily machined and produces small brittle chips. It can be machined at high speeds with deep cuts and heavy feeds on powerful, rigid equipment. Sharp aggressive tooling and coolants with superior lubrication properties are recommended.

PRODEC is the Outokumpu trademark for a highly sophisticated steelmaking process. It achieves superior control of the amount, composition, size, and shape of the sulfides in the mill product. The high content of sulfur and the uniformity of the distribution of the sulfides give consistently high machining rates for high speed steel tooling as used in screw machines. The PRODEC process also modifies the composition of oxides for improved machinability, providing significantly higher speeds for carbide tooling. While the application of PRODEC technology to 303 stainless steel is a continuing evolution, we have already found improvements of 20% and greater relative to common Type 303 in a wide range of machining operations.

Mechanical Properties

Table 2

	Typical
Tensile Strength, ksi	90
0.2% Yield Strength, ksi	43
Elongation in 2 inches, %	55
Reduction in Area, %	60
Hardness*	HB 180, HR B87

*PRODEC 303 will typically be delivered with hardness in the range of HB 160-190, the range suitable for most general machining operations.

Chemical Composition, wt. pct.

Table 3

	Type 303	PRODEC® 303
Carbon	0.15 max	0.05
Manganese	2.00 max	1.75
Phosphorus	0.20 max	0.040
Sulfur	0.15 min	0.34
Silicon	1.00 max	0.60
Chromium	17.0-19.0	17.2
Nickel	8.0-10.0	8.6

Physical Properties

Table 4

Density, lb/in ³	0.285
Modulus of Elasticity, psi	29 x 10 ⁶
Coefficient of Thermal Expansion, 68-212°F, /°F	9.4 x 10 ⁻⁶
Thermal Conductivity, Btu/ft hr°F	8.7
Heat Capacity, Btu/lb°F	0.12
Electrical Resistivity, Ω-inch	28.7 x 10 ⁻⁶

Heat Treatment Annealing

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

Hardening

PRODEC 303 cannot be hardened by heat treatment but can be hardened by cold deformation.

Welding

PRODEC 303 stainless steel is not recommended for applications requiring welding. When welding is necessary, AWS E312 filler metal may be considered. An alternative for parts requiring welding is Outokumpu's PRODEC® 304.

Technical Support

Outokumpu assists users and fabricators in the selection, qualification, installation, operation, and maintenance of PRODEC 303 stainless steel. Technical personnel, supported by the research laboratory of Outokumpu, can draw on years of field experience with PRODEC 303 to help you make the technically and economically correct materials decision.

Outokumpu is prepared to discuss individual applications and to provide data and experience as a basis for selection and application of PRODEC 303.

Outokumpu works closely with its distributors to ensure timely availability of PRODEC 303 in the forms, sizes, and quantities required by the user. For assistance with technical questions and to obtain top quality PRODEC 303, call Outokumpu at 1-800-833-8703.

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Outokumpu is a global leader in stainless steel. Our vision is to be the undisputed number one in stainless, with success based on operational excellence. Customers in a wide range of industries use our stainless steel and services worldwide. Being fully recyclable, maintenance-free, as well as very strong and durable material, stainless steel is one of the key building blocks for sustainable future.

What makes Outokumpu special is total customer focus – all the way, from R&D to delivery. You have the idea. We offer world-class stainless steel, technical know-how and support. We activate your ideas.



Outokumpu 425 North Martingale Road, Suite 1600, Schaumburg, IL 60173-2218 USA
Tel. 1-800-833-8703 Fax 1-800-545-8617