

Standard Cr-Ni Austenitic Stainless Steel

EN - 1.4301/ 1.4307 – ASTM 304 /304 L

PRODEC® / MAXIVAL®

A stainless austenitic steel

Typical analysis %	C 0,03	Cr 18,5	Ni 8,7	Mo -
Delivery condition	Solution annealed			

(Replaces SS 2333 –02, 27)

Mechanical properties

Values for solution annealed condition to EN 10088 - 3

Tensile strength Rm	N/mm ²	520 - 700
Proof strength Rp ₀₂	N/mm ²	min 210
Elongation A ₅	%	min 45
Impact energy KV – 20°C	J/cm ²	Min 100
Hardness	HB	Max 215

Physical properties

Temperature ° C	20	100	200	300	400	500
Density Kg/dm ³	7,9					
Modulus of elasticity kN/mm ²	200	194	186	179	172	165
Mean coeff. of thermal expansion 20 ⁰ C –Temp. 10 ⁻⁶ K ⁻¹	-	16,0	16,5	17,0	17,5	18,0
Specific Thermal Capacity W/m ⁰ C	15					
Electrical Resis- tivity Ω mm ² /m	0,73					
Specific heat J/kg ⁰ C	500					

EN 1.4301/1.4307 PRODEC® or MAXIVAL® is a general purpose austenitic stainless steel with good resistance to atmospheric corrosion and to many organic and inorganic chemicals. It is non-magnetic in the annealed condition but may become slightly magnetic due to the introduction of martensite or ferrite at the cold-working or welding stages.

PRODEC® or MAXIVAL® indicates that the steel has been modified in order to obtain good machinability.

Design features

- ⇒ Good corrosion resistance
- ⇒ Very good machinability
- ⇒ Excellent weldability
- ⇒ Excellent impact strength

Corrosion resistance

EN 1.4301/ 1.4307 has good resistance to atmospheric corrosion with some restrictions particularly regarding marine and coastal environments.

Also the grade has a good resistance to many (mildly corrosive) organic and inorganic chemicals.

Austenitic stainless steels are sensitive to intergranular corrosion due to grain boundary precipitation of chromium carbides, which can occur in the temperature range 550 - 850°C. It is not a common problem for modern stainless steels since the carbon content is generally kept at a low level. Steels with low carbon content (0,02%) have good resistance to intergranular corrosion.

The resistance to pitting and crevice corrosion is moderate. These types of corrosion typically occur in acidic, neutral or slightly alkaline solutions and in media with a low chloride content.

The grade EN 1.4301/1.4307 is susceptible to stress corrosion cracking. Critical service conditions, i. e. applications subjected to combinations of tensile stresses, temperatures above about 50°C and solutions containing chlorides, should be avoided.

Heat treatment

Solution annealing

1050 - 1100° C. Holding time at solution annealing temperature approx. 30 min., followed by rapid cooling in water.

Hardening

These grades cannot be hardened by heat treatment. But they can be hardened by cold working.

Machining

Austenitic stainless steel are more difficult to machine than ordinary carbon steels. They require higher cutting forces than carbon steels, show resistance to chip breaking and a high tendency to built-up edge formation. Generally the machinability decreases with higher contents of alloying elements.

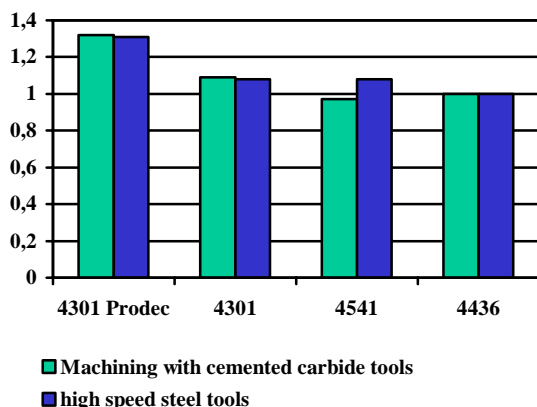
The best machining results are obtained by using high-power equipment, sharp tooling and a rigid set-up.

Also the machining properties can be improved through modifications in the metallurgical practice. This is the case in Avesta Polarit PRODEC® versions and applied under license also by Acciaierie Valbruna or the MAXIVAL®

EN 1.4301/ 1.4307 PRODEC® or MAXIVAL® as such is not a " stainless free cutting steel " but a high class norm steel. The machinability has been improved through modifications in the metallurgical practice. It is an " easy to machine steel", considered for parts where extensive machining is required, and still basically the same corrosion properties are maintained.

The machinability of EN 1.4301 PRODEC in relation to other stainless steels is indicated by the machinability index given in the diagram below. This index, which rises with increased machinability, is based on a compound evaluation of test data from several different machining operations. It gives an indication of the machinability of different stainless steel grades in relation to that of grade (EN 1.4436). It should be noted that it does not describe the relative difficulty of machining with cemented carbide and high speed steel tools. For more information, contact Valbruna Nordic.

Machinability index



Welding

These grades can be readily welded by a full range of conventional welding methods.

Surface finish

EN 1.4301/1.4307 is available with ground, peeled and machined surface.

Stock standard

Please refer to our stock standard leaflet.

Technical support

VALBRUNA NORDIC AB will be helpful in giving further advice and recommendations concerning choice of materials, cutting data, welding, heat treatment, etc.

MATERIAL STANDARDS

EN 10088-3	Stainless steels-Semi-finished products, bars, rods, sections for general purposes
EN 10028-7	Flat products for pressure purposes-Stainless steels
EN 10272	Stainless steel bars for pressure purposes
ASTM A 276/ ASME SA-276	Stainless steel bars for general purposes
ASTM A 479/ ASME SA-479	Stainless steel bars for pressure boilers/pressure vessels