



North American Stainless

Flat Products Stainless Steel Grade Sheet

301 (S20100)/ EN 1.4310

301LN (S20153)/ EN 1.4318

Introduction:

301SS is a lower-cost alternative to the conventional high-nickel austenitic stainless steels, such as SS304. 301SS is available with lower nickel content and higher chromium level to substitute 304SS in various different applications. This grade is available in different nickel levels depending upon the requirement of stainless steel users. Nickel is replaced by different levels of copper, carbon and nitrogen. 301SS thus has excellent ductility and formability. It also has excellent low-temperature properties and responds similarly to 304SS for many drawing applications. Higher strength inherent to this grade makes this grade available in six different temper finishes (conditions) used in different structural applications.

301 SS has good welding characteristics. Post-weld annealing is not normally required to restore the excellent performance for the low-carbon version of this grade in a wide range of mildly corrosive conditions.

SS301(6% nickel) has excellent formability and corrosion resistance which makes it suitable for applications such as kitchen appliances and accessories, catering equipment, pots and pans, automobile molding and trim.

Product Range:

Product is available in Cold Rolled, Continuous Mill Plate and Plate Mill Plate form up to 60" wide in various thicknesses.

For inquiry about minimum quantity, specific thickness and tolerances, contact inside sales at NAS.

Certification:

ASTM A240, A480, A666, ASME SA240, SA480, SA666, ASTM A262

Chemical Composition:

UNS	ASTM	Carbon	Manganese	Phosphorous	Sulfur	Silicon	Chromium	Nickel	Nitrogen
S30100	301	0.15 max	2 max	0.045 max	0.03 max	1 max	16-18	6.0-8.0	0.1 max
S30153	301LN	0.03 max	2 max	0.045 max	0.03 max	1 max	16-18	6.0-8.0	0.07-0.20

301SS is available at NAS with three different levels of nickel.

301 6% nickel– regular economical grade with good drawing properties

301 7% nickel – available in higher-strength temper condition

301 7.6% nickel – deep drawing applications

Mechanical Properties:

	Tensile strength min	Yield Strength min	Elongation min	Hardness max
301	75 ksi	30 ksi	40%	95HRB
301LN	80 ksi	35 ksi	45%	100 HRB

Note: Enhanced properties available upon request.

Mechanical Properties for Temper Finish:

	Tensile strength min	Yield Strength min	Elongation % min
1/16 Hard	90 ksi	45 ksi	40
1/8 Hard	100 ksi	55 ksi	40
1/4 Hard	125ksi	75 ksi	25
1/2 Hard	150 ski	110 ksi	15
3/4 Hard	175 ksi	135 ksi	10
Full Hard	185 ksi	140 ksi	8

THERMAL PROCESSING & FABRICATION**ANNEALING**

Annealing of types SS301 and SS301LN is achieved by heating to above 1900°F and for 90 minutes per 25mm thickness followed by water or air quenching. The best corrosion resistance is achieved when the final annealing temperature is above 1900°F. Controlled atmospheres are recommended in order to avoid excessive oxidation of the surface.

STRESS RELIEVING

The lower-carbon grade 301LN can be stress relieved at 450°C to 600°C for 60 minutes with little danger of sensitization. If, however, stress relieving is to be carried out above 600°C, there is a serious threat of grain boundary sensitization occurring with a concomitant loss in corrosion resistance.

COLD WORKING

301 SS has moderate ductility and toughness compared to 304SS and can be readily deep drawn and stamped. Since 30S types work harden faster than 304, severe cold-forming operations should be followed by annealing.

WELDING

301 SS types have good welding characteristics and are suited to all standard welding methods. Either matching or slightly over-alloyed filler wires should be used. For maximum corrosion resistance, the higher-carbon type SS301 should be annealed after welding to dissolve any chromium carbides which may have precipitated. The weld discoloration should be removed by pickling and passivation to restore maximum corrosion resistance.

Corrosion Resistance:

301 SS have corrosion resistance similar to type 304SS in solution-annealed condition.

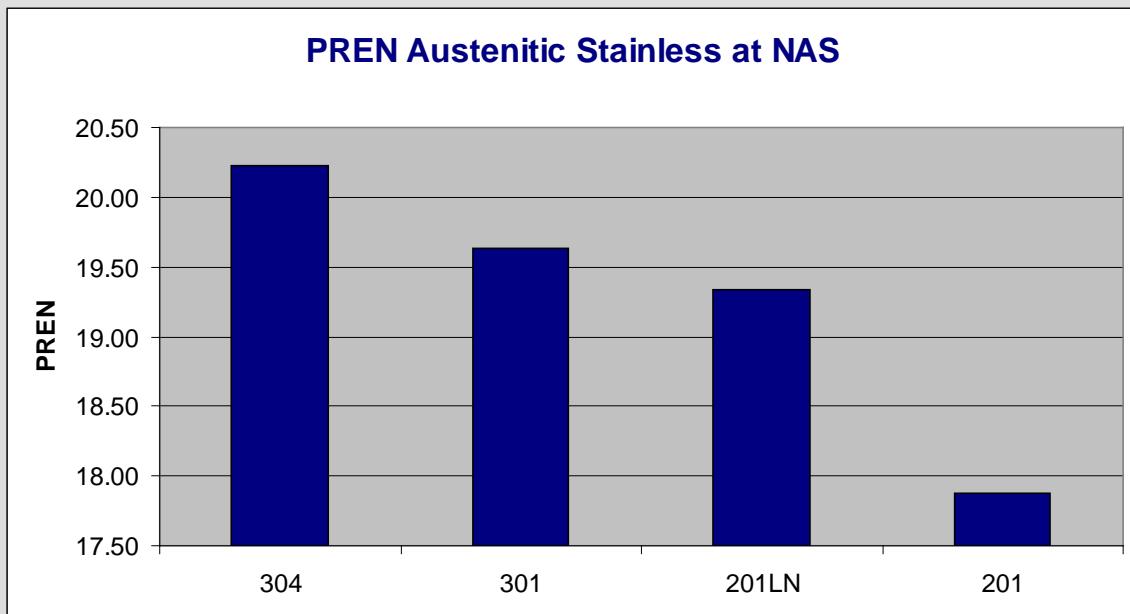
Pitting Resistance:

Pitting resistance is important, mainly in applications involving contact with chloride solutions, particularly in the presence of oxidizing media. These conditions may be

conductive to localized penetration of the passive surface film on the steel and a single deep pit may well be more damaging than a much greater number of relatively shallow pits. Where pitting corrosion is anticipated, steels containing molybdenum (such as 316L) should be considered.

Pitting-resistance equivalent numbers (PREN) are a theoretical way of comparing the pitting corrosion resistance of various types of stainless steels, based on their chemical compositions. The PREN (or PRE) numbers are useful for ranking and comparing the different grades, but cannot be used to predict whether a particular grade will be suitable for a given application, where pitting corrosion may be a hazard.

Typical PREN on NAS grades and comparison are shown below.



The resistance to pitting and crevice corrosion in oxidizing chloride environments was evaluated using ASTM G48 methods A and B. Samples of alloy type 304, 301, 201, and 430 were exposed for a period of 72 hours at 22° C in oxidizing chloride acid. The results are summarized in Table 2.

		Type 304	Type 301	Type 201	Type 430
ASTM G48 A Pitting Test	Mass Loss	.0063 g/cm ²	.0105 g/cm ²	.0098 g/cm ²	.0280 g/cm ²
ASTM G48 B Crevice Test	Mass Loss	.0067 g/cm ²	.0086 g/cm ²	.0130 g/cm ²	.0265 g/cm ²

Table 2. Results of ASTM G48 A and B Pitting and Crevice Corrosion Tests

INTERGRANULAR CORROSION

Sensitization may occur when the Heat Affected Zones of welds in some austenitic stainless steels are cooled through the sensitizing temperature range of between 450°C and 850°C. At this temperature, a compositional change may occur at the grain boundaries. If a sensitized material is then subjected to a corrosive environment, intergranular attack may be experienced. This corrosion takes place preferentially in the heat affected zone away from and parallel to the weld. Susceptibility to this form of attack, often termed “weld decay”, may be assessed by the following

Standard tests: Boiling copper sulphate/sulphuric acid test as specified in ASTM A262, Practice A & E. 301SS inherently is designed to have higher carbon content as compared to Type 304SS, which makes this grade more susceptible to sensitization

Technical Service: For further information, email qualitycontrol@northamericanstainless.com

For new product development requirements, contact sales@northamericanstainless.com.

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