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301 Stainless Steel

AMS 5901 / UNS S30100

Type 301 is an austenitic stainless steel with a nominal composition of 17% chromium and 7% nickel. The high strengths of this grade of steel in the six available conditions or tempers, its resistance to atmosphere corrosion and its bright, attractive surface make it an excellent choice for decorative structural applications. By varying the chemical composition within the limits set by the ASTM specifications and by temper rolling, a broad range of magnetic and mechanical properties can be obtained for a variety of applications.

Nominal Composition %

- C — Carbon - 0.150% maximum
- Mn — Manganese - 2.000% maximum
- P — Phosphorus - 0.045% maximum
- S — Sulfur - 0.030 maximum
- Si — Silicon - 1.00% maximum
- Cr — Chromium - 16.00 - 18.00%
- Ni — Nickel - 6.000% - 8.000%
- N — Nitrogen - 0.10% maximum

Percent by weight, maximum unless a range is listed.

Applications

- Aircraft structural parts
- Trailer bodies
- Architectural
- Autobody trim / wheel covers
- Utensils and tablewear
- Conveyor parts

Standard Inventory Specifications

- AMS: 5901
- UNS S30100
- ASTM A 240
- ASTM A 666
- ASME SA 240
- ASME SA 666
- EN 1.4310
- PWA-LCS
- GE Aircraft Engine (GT193)
- GE Aviation S-SPEC-35 AeDMS S-400
- RR SABRe Edition 2
- DFARS Compliant

Forms Stocked

- Bar - 0.20” - 0.125” thick
- Sheet - 0.020” - 0.125” thick
- Rolled Strip - 0.0008” - 0.012”

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Features

- Provides good strength and ductility when cold worked
- Excellent corrosion resistance
- Well suited to welding and forming and drawing
- Attractive surface

Resistance to Corrosion: Type 301 is resistant to a variety of corrosive media. However, the corrosion properties are not as good as the 18-8 chromium-nickel steels. Its susceptibility to carbide precipitation during welding restricts its use in many applications in favor of Types 304 or 304L.

Resistance to Oxidation: Type 301 possesses good resistance to oxidation at temperatures up to 1550°F (840°C). At 1600°F (871°C) it exhibits an oxidation weight gain of 10mg/cm² in 1,000 hours. Therefore, this stainless steel is not suggested for use at 1600°F or above

The technical data provided is for information only and not for design purposes. It is not warranted or guaranteed.

Physical Properties

Linear Coefficient of Thermal Expansion

Temperature Range		Coefficients	
°C	°F	cm/cm°C	in/in/°F
20-100	68-212	$16.6 \cdot 10^{-6}$	$9.2 \cdot 10^{-6}$
20-300	68-572	$17.6 \cdot 10^{-6}$	$9.8 \cdot 10^{-6}$
20-500	68-932	$18.6 \cdot 10^{-6}$	$10.3 \cdot 10^{-6}$
20-700	68-1292	$19.5 \cdot 10^{-6}$	$10.8 \cdot 10^{-6}$
20-871	68-1600	$19.8 \cdot 10^{-6}$	$11.0 \cdot 10^{-6}$

Thermal Conductivity

Temperature Range		Coefficients	
°C	°F	W/m·K	Btu/(hr/ft²/hr/°F/ft)
20-100	68-212	16.30	9.40
20-500	68-932	21.40	12.4

Specific Heat

Temperature Range		J/kg°K	Btu/lb/°F
°C	°F		
0-100	32-212	500	0.12

Magnetic Permeability

H/m annealed
1.02 Max @ 200 H

Electrical resistivity (Annealed Condition)

Temperature Range		microhm-cm	microhm-in
°C	°F		
20	68	72	28.3
100	212	78	30.7
200	392	86	33.8
400	752	100	39.4
600	1112	111	43.7
800	1472	121	47.6
900	1652	126	49.6

Mechanical Properties

301 is used in the annealed and cold rolled conditions. In the work-hardened condition, Type 301 develops higher tensile strength than the other stable austenitic grades. Minimum properties for plate, sheet and strip per ASTM A240 and A666 follow.

Condition	Tensil Strength, Min.		0.2% Yield Strength, Min.		Elong. In 2” (50mm)
	Ksi	MPa	Ksi	MPa	%, Min.
Annealed	75	515	30	205	40
¼ Hard	125	862	75	517	25
½ Hard	150	1,034	110	758	18*
¾ Hard	175	1,207	135	931	12*
Full Hard	185	1,276	140	965	9*