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ALLOY TECHNICAL DATA SHEET

TYPE 301 STAINLESS STEEL

Austenitic Stainless Steel · UNS S30100

GENERAL PROPERTIES

Type 301 is an austenitic stainless steel with a nominal composition of 17 percent chromium and 7 percent nickel. Its high strength in the cold-rolled tempers, resistance to atmospheric corrosion and bright, attractive surface have made it widely used for springs and structural or decorative parts.

Typical applications include springs, hose clamps, automotive trim and wheel covers, conveyor belts, kitchen equipment, roof drainage systems, truck and trailer bodies, and railway cars. By varying chemistry within ASTM limits and by temper rolling, a broad range of magnetic and mechanical properties can be obtained.

CHEMICAL COMPOSITION

Percent by weight, maximum unless range is specified — ASTM A240 / A666

Element	301
Carbon	0.15
Manganese	2.00
Phosphorus	0.045
Sulfur	0.030
Silicon	1.00
Chromium	16.00–18.00
Nickel	6.00–8.00
Nitrogen	0.10
Iron	Balance

MECHANICAL PROPERTIES

Type 301 is used in the annealed and cold-rolled conditions. When work-hardened it develops higher tensile strength than the other stable austenitic grades.

Minimum room-temperature properties, ASTM A240 and A666

Temper	Tensile, ksi (MPa)	0.2% Yield, ksi (MPa)	Elong. in 2", %
Annealed	75 (515)	30 (205)	40
1/4 Hard	125 (862)	75 (517)	25
1/2 Hard	150 (1,034)	110 (758)	18*†
Full Hard	185 (1,276)	140 (965)	9*‡

**Elongation shown for thickness greater than 0.015" (0.38 mm). †AMS 5518 (1/2 Hard) requires 15% minimum for 0.015" (0.38 mm) and under, and 18% minimum over 0.015". ‡AMS 5519 (Full Hard) requires 8% minimum for 0.015" (0.38 mm) and under, and 9% minimum over 0.015".*

PHYSICAL PROPERTIES

Melting range	2550–2590 °F (1399–1421 °C)
Density	0.29 lb/in^3 (8.03 g/cm^3)
Specific gravity	8.03
Modulus of elasticity (tension)	28 × 10^6 psi (193 GPa)*
Specific heat, 32–212 °F	0.12 Btu/lb·°F (500 J/kg·K)

Annealed condition, average composition. *The modulus is lowered in the cold-worked condition.

THERMAL EXPANSION

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

Expansion is higher than many other metals — consider it when designing assemblies with dissimilar materials.

THERMAL CONDUCTIVITY

°F	°C	Btu/hr·ft·°F	W/m·K
68–212	20–100	9.4	16.3
68–932	20–500	12.4	21.4

ELECTRICAL RESISTIVITY

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

MAGNETIC PERMEABILITY

Properly annealed Type 301 is fully austenitic, with magnetic permeability of 1.02 maximum at 200 H. Cold working forms martensite and increases magnetic permeability.

CORROSION & OXIDATION RESISTANCE

Type 301 resists a variety of corrosive media, though not as well as the 18-8 chromium-nickel grades. Susceptibility to carbide precipitation during welding favors Types 304 or 304L for many welded applications.

Oxidation resistance is good up to about 1550 °F (840 °C). Use at 1600 °F (871 °C) and above is not suggested. Oxidation rates depend heavily on atmosphere, thermal cycling and design.

Values are typical or specification minimums as noted, provided for information only, and should not be used as design limits or as a guarantee of properties for any particular lot or application. Certified test reports are supplied with each order.

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