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ALLOY TECHNICAL DATA SHEET

TYPES 316 & 316L STAINLESS STEEL

Chromium-Nickel-Molybdenum Austenitic Stainless · UNS S31600 · S31603

GENERAL PROPERTIES

Types 316 and 316L are molybdenum-bearing austenitic stainless steels that resist general corrosion and pitting/crevice corrosion better than the conventional chromium-nickel grades such as Type 304. They also offer higher creep, stress-to-rupture and tensile strength at elevated temperature, along with the excellent fabricability and formability typical of austenitic stainless.

CHEMICAL COMPOSITION

Percent by weight, maximum unless range is specified — ASTM A240 / ASME SA-240

Element	316	316L
Carbon	0.08	0.030
Manganese	2.00	2.00
Silicon	0.75	0.75
Chromium	16.00–18.00	16.00–18.00
Nickel	10.00–14.00	10.00–14.00
Molybdenum	2.00–3.00	2.00–3.00
Phosphorus	0.045	0.045
Sulfur	0.030	0.030
Nitrogen	0.10	0.10
Iron	Balance	Balance

MECHANICAL PROPERTIES

Minimum properties, annealed plate, sheet & strip — ASTM A240 / ASME SA-240

Property	316	316L
Tensile, psi (MPa)	75,000 (515)	70,000 (485)
0.2% Yield, psi (MPa)	30,000 (205)	25,000 (170)
Elongation in 2" (51 mm), %	40	40
Hardness, max. Brinell (Rockwell B)	217 (95)	217 (95)

PHYSICAL PROPERTIES

Melting range	2540–2630 °F (1390–1440 °C)
Density	0.29 lb/in^3 (8.03 g/cm^3)
Specific gravity	8.03
Modulus of elasticity (tension)	29 × 10^6 psi (200 GPa)*
Specific heat, 68 °F	0.108 Btu/lb·°F (450 J/kg·K)
Specific heat, 200 °F	0.116 Btu/lb·°F (485 J/kg·K)
Electrical resistivity, 68 °F	29.1 microhm-in (74.0 microhm-cm)

*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}	16.5 × 10^{-6}
68–932	20–500	10.1 × 10^{-6}	18.2 × 10^{-6}
68–1832	20–1000	10.8 × 10^{-6}	19.5 × 10^{-6}

THERMAL CONDUCTIVITY

°F	°C	Btu/hr·ft·°F	W/m·K
68–212	20–100	8.4	14.6

Overall heat transfer depends on more than the conductivity of the metal. Because the austenitic stainless grades keep their surfaces clean, they often transfer heat better in service than metals with higher thermal conductivity.

MAGNETIC PERMEABILITY

Non-magnetic in the annealed, fully austenitic condition — magnetic permeability is generally less than 1.02 at 200 H.

CORROSION RESISTANCE

Types 316 and 316L resist atmospheric and other mild corrosion better than the 18-8 grades; in general, media that do not corrode 18-8 stainless will not attack them. A known exception is highly oxidizing acids such as nitric acid, to which the molybdenum grades are less resistant.

They are considerably more resistant than other chromium-nickel types to sulfuric acid solutions and to condensing sulfur-bearing gases, although acid concentration strongly affects attack rates and service testing is recommended. They also resist hot phosphoric, organic and fatty acids, making them common in food and pharmaceutical processing where metallic contamination must be minimized.

The two grades generally perform equally well. Where corrosion is severe enough to attack welds and heat-affected zones, 316L is preferred for welded parts because its low carbon improves resistance to intergranular corrosion.

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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