Data Sheet
321 Stainless Steel

321 stainless is a titanium stabilized grade commonly used for service in the 1000-1600°F temperature range. For service temperatures up to about 1600°F, a stabilizing treatment at 1550-1650°F, air cool, may be used to provide optimum resistance to intergranular corrosion and to polythionic acid stress corrosion cracking.

321 stainless is readily welded by all common methods including submerged arc. Appropriate weld fillers are AWS ER347 bare wire and E347 covered electrodes. 321 stainless is similar in machinability to 304 stainless steel. It has a machinability rating of 45% relative to AISI B1112.

Specifications

UNS: S32100 **W. Nr./EN:** 1.4541 **AMS:** 5510, 5645 **ASTM:** A 240, A 276, A 312, A 479 **GE:** B50T1181
ASME: SA-240, SA-276, SA-312, SA-479 **QQS:** 766d, 763

Chemical Composition, %

	Cr	Ni	Mo	Ti	C	Mn	Si	P	S	N	Fe
MIN	17.0	9.0	–	5x(C+N)	–	–	0.25	–	–	–	–
MAX	19.0	12.0	0.75	0.7	0.08	2.0	1.0	0.045	0.03	0.1	balance

Features

- Oxidation resistant to 1600°F
- Stabilized against weld heat affected zone (HAZ) intergranular corrosion
- Resists polythionic acid stress corrosion cracking

Applications

- Aircraft piston engine manifolds
- Expansion joints
- Thermal oxidizers
- Refinery equipment
- High temperature chemical process equipment

Physical Properties

Density: 0.286 lb/in^3 **Melting Range:** 2550 - 2600°F

Temperature, °F	200	400	800	1000	1200	1400	1600
Coefficient of Thermal Expansion* in/in°F x 10^{-6}	9.3	9.4	10.0	10.3	10.6	10.9	11.1
Thermal Conductivity Btu • ft/ft^2 • hr • °F	8.8	9.7	11.4	12.1	–	–	–
Modulus of Elasticity, Dynamic psi x 10^6	28.0	26.5	23.8	22.5	21.2	19.7	–

** 70°F to indicated temperature.*

Electrical Resistivity

Temperature, °F	68	212	392	752	1112	1472	1652
ohm circ mil/ft	430	470	515	600	670	725	760

Mechanical Properties

Average Elevated Temperature Tensile Properties

Temperature, °F	68	400	800	1000	1200	1350	1500
Ultimate Tensile Strength, ksi	93.3	73.6	69.5	63.5	52.3	39.3	26.4
0.2% Yield Strength, ksi	36.5	36.6	29.7	27.4	24.5	22.8	18.6

Average Stress for Rupture

Temperature, °F	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500
1,000 hours, ksi	34	29	22	17.5	13	11.5	7.5	6.5	5	4
10,000 hours, ksi	27.5	22	16	12.5	9	7	5	4	3	2.5
100,000 hours, ksi	21.5	15	10.5	7.5	5	4	3.5	2.5	2.3	2

Average Stress for Secondary (minimum) Creep Rate

Temperature, °F	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500
1% in 10,000 hours, ksi	–	16	17.5	10	7.5	5.5	3.5	2.5	2	1
1% in 100,000 hours, ksi	–	11.5	8	6.5	4.5	3	2.5	2	1.5	0.5

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