

### Stainless steel

### Alloys 321

### (UNS S32100)

#### Application

Grade 321 stainless steel (1.4541) is a heat resistant grade supplied into numerous industry sectors. The key property of this grade is the added titanium content (5 x C%) stabilising the material and making its resistance to carbide precipitation when exposed to high temperatures and resistance to oxidation its main characteristics.

Whilst retaining good strength and corrosion resistance when exposed to high temperatures, this grade of stainless steel like most austenitic grades will also maintain its strength and toughness at sub-zero temperatures, making this an excellent choice for various applications ranging from oil refinery equipment to automotive exhaust systems. This heat resistant grade of stainless steel has a maximum dry air service temperature of 850°C.

#### Available tube product forms

**STRAIGHT** || **COILED** || **SEAMLESS** || **WELDED**

#### Typical manufacturing specifications

ASTM A213, ASTM A269, ASTM A312, ASTM A632

Also individual customer specifications.

#### Industries predominantly using this grade

Exhaust Systems, Manifolds, Chemical Plant

Heat Exchangers, Furnace Parts, Chimney and Stack Liners

#### Maximum Coil Length per Dimension (Unit : meter)

		Wall thickness (mm)					
		0.51	0.71	0.89	1.24	1.65	2.11
Outside diameter r (mm)	3.175	2966	2303	1982	-	-	-
	6.35	1353	1007	829	636	-	-
	9.53	876	644	524	392	310	257
	12.7	-	473	383	284	221	<b>180</b>
	19.05	-	-	249	183	140	113
	25.4	-	-	-	135	103	82

can provide longer length according to customer requirement

#### Technical Data

#### Chemical composition(% by weight)

Element	C	Mn	P	S	Si	Ni	Cr	-	-	-	-	-
Minimum	-	-	-	-	-	9.0	17.0	-	-	-	-	-
Maximum	0.080	2.00	0.045	0.030	1.00	12.0	19.0	-	-	-	-	-
Aiming	0.045	1.4	0.025	0.002	0.3	9.2	17.3	-	-	-	-	-

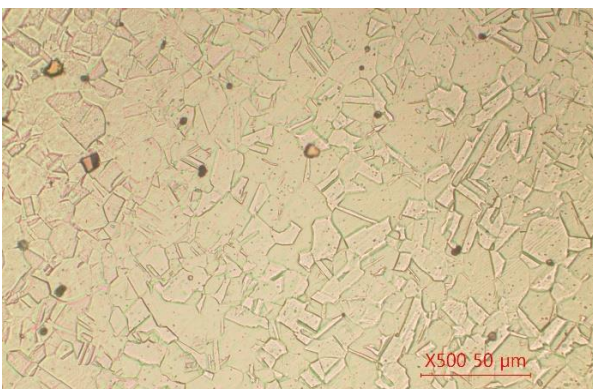
#### Mechanical Properties

	Specifications(Tubing, Annealed)		Actual data	
Tensile Rm	75	ksi (min.)	79~98	ksi
Tensile Rm	515	MPa (min.)	550~680	MPa
Yield (R.p. 0.2%)	30	ksi (min.)	35~56	ksi
Yield (R.p. 0.2%)	205	MPa (min.)	250~370	MPa
Elongation	34	% (min.)	45~52	%

#### Physical Properties(Room Temperature)

Specific Heat (0-100°C)	465	J.kg <sup>-1</sup> .°K <sup>-1</sup>
Thermal Conductivity	14	W.m <sup>-1</sup> .°K <sup>-1</sup>
Thermal Expansion	17.5	mm/m.°C
Modulus Elasticity	200	GPa
Electrical Resistivity	72	μohm.cm
Density	7.90	g/cm <sup>3</sup>

#### Microstructure



#### Maximum allowable pressure (Unit : BAR)

		Wall thickness (mm)						
		0.89	1.24	1.65	2.11	2.77	3.96	4.78
Outside diameter r (mm)	6.35	387	562	770	995	-	-	-
	9.53	249	356	491	646	868	-	-
	12.7	183	261	356	468	636	-	-
	19.05	-	170	229	299	403	-	-
	25.4	-	126	169	219	294	436	540
	31.8	-	-	134	173	231	340	418
	38.1	-	-	111	143	190	279	342
	50.8	-	-	83	106	141	205	251

\* We follow customer requested dimensions.

\* Select tubes according to design pressure