

### Stainless steel

### Alloys 316Ti

### (UNS S31635)

#### Application

316Ti (UNS S31635) is a titanium stabilised version of 316 molybdenum-bearing austenitic stainless steel. The 316 alloys are more resistant to general corrosion and pitting/crevice corrosion than the conventional chromium-nickel austenitic stainless steels such as 304. They also offer higher creep, stress-rupture and tensile strength at elevated temperature. High carbon Alloy 316 stainless steel can be susceptible to sensitisation, the formation of grain boundary chromium carbides at temperatures between approximately 900 and 1500°F (425 to 815°C) which can result in intergranular corrosion.

Resistance to sensitisation is achieved in Alloy 316Ti with titanium additions to stabilise the structure against chromium carbide precipitation, which is the source of sensitisation. This stabilisation is achieved by an intermediate temperature heat treatment, during which the titanium reacts with carbon to form titanium carbides. This significantly reduces susceptibility to sensitisation in service by limiting the formation of chromium carbides. Thus, the alloy can be used for extended periods at elevated temperatures without compromising its corrosion resistance.

316Ti has equivalent corrosion resistance to sensitisation as the low carbon version 316L.

#### Technical Data

#### Available tube product forms

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

#### Typical manufacturing specifications

ASTM A213

Also individual customer specifications.

#### Industries predominantly using this grade

Chemical processes, High temperature

Automotive, Oil and Gas etc.

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

		Wall thickness (mm)					
		0.51	0.71	0.89	1.24	1.65	2.11
Outside diameter (mm)	3.175	2927	2273	1956	-	-	-
	6.35	1336	994	819	628	-	-
	9.53	865	635	517	387	306	254
	12.7	-	467	379	280	218	178
	19.05	-	-	246	180	139	111
	25.4	-	-	-	133	102	81

\* We can provide longer length according to customer requirement

#### Chemical composition(% by weight)

Element	C	Mn	P	S	Si	Ni	Cr	Mo	N	Ti	-	-
Minimum	-	-	-	-	-	10.0	16.0	2.00	-	5*(C+N)	-	-
Maximum	0.080	2.00	0.045	0.030	0.75	14.0	18.0	3.00	0.10	0.70	-	-
Aiming	0.03	1.5	0.03	0.002	0.5	10.5	16.6	2.0	-	0.3	-	-

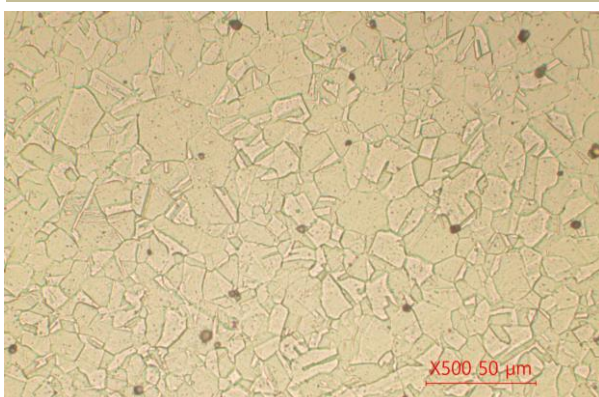
#### Mechanical Properties

	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	35	% (min.)	45~52	%

#### Physical Properties(Room Temperature)

Specific Heat (0-100°C)	500	J.kg <sup>-1</sup> .°K <sup>-1</sup>
Thermal Conductivity	14.6	W.m <sup>-1</sup> .°K <sup>-1</sup>
Thermal Expansion	16.5	mm/m/°C
Modulus Elasticity	193	GPa
Electrical Resistivity	74	μohm.cm
Density	8.0	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 (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

\* Please let us know your design pressure, we can produce requested tube size

\* The table above is for your reference