

Stainless steel Alloys 316/316L (UNS S31600/S31603)

Application

Grade 316 is the standard molybdenum-bearing grade, second in overall volume production to 304 amongst the austenitic stainless steels. The molybdenum gives 316 better overall corrosion resistant properties than Grade 304, particularly higher resistance to pitting and crevice corrosion in chloride environments.

Grade 316L, the low carbon version of 316 and has very high immunity from sensitization (grain boundary carbide precipitation). It is extensively used in the oil and gas and chemical industries for its cost effective corrosion resistance and ease of fabrication. There is commonly no appreciable price difference between 316 and 316L stainless steel. The austenitic structure also gives these grades excellent toughness, even down to cryogenic temperatures. Compared to chromiumnickel austenitic stainless steels, 316L stainless steel offers higher creep, stress to rupture and tensile strength at elevated temperatures.

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

Process engineering, Control lines, Heat Exchangers

Condensers, Semiconductors, Medical implants 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 r (mm)	3.175	2935	2279	1961	-	-	-
	6.35	1339	996	821	630	-	-
	9.53	867	637	519	388	307	255
	12.7	-	469	379	281	219	179
	19.05	-	-	247	181	139	112
	25.4	-	-	-	133	102	81

can provide longer length according to customer requirement

Technical Data

Chemical composition(% by weight)

Element	C	Mn	P	S	Si	Ni	Cr	Mo	-	-	-	-
Minimum	-	-	-	-	-	10.0	16.0	2.0	-	-	-	-
Maximum	0.035	2.00	0.045	0.030	1.00	14.0	18.0	3.0	-	-	-	-
Aiming	0.01	0.6	0.03	^{0.001} - _{0.007}	0.4	12.1	17.5	2.1~2.6	-	-	-	-

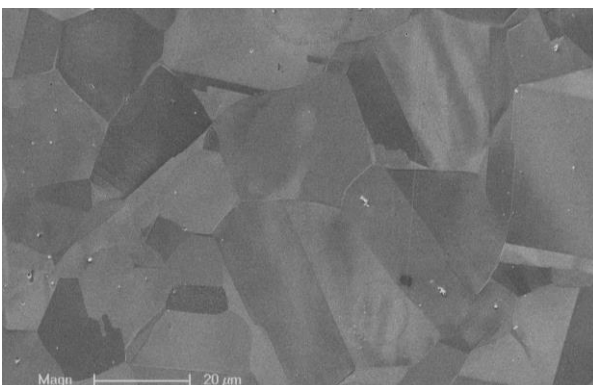
Mechanical Properties

	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.)	31~50	ksi
Yield (R.p. 0.2%)	205	MPa (min.)	220~350	MPa
Elongation	35	% (min.)	45~58	%

Physical Properties(Room Temperature)

Specific Heat (0-100°C)	500	J.kg ⁻¹ .°K ⁻¹
Thermal Conductivity	16.3	W.m ⁻¹ .°K ⁻¹
Thermal Expansion	15.9	mm/m.°C
Modulus Elasticity	193	GPa
Electrical Resistivity	7.4	μohm.cm
Density	7.99	g/cm ³

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