

### Stainless steel

### Alloys 316L VIM/VAR

### (UNS S31603)

#### Application

316L VIM/VAR(Double melt) stainless steel, regarded as a medical grade, this stainless steel is vacuum melted to achieve high levels of purity and cleanliness. It has excellent resistance to both general and intergranular corrosion, and pitting and crevice corrosion. The vacuum melt allows for superior surface finish.

VIM/VAR stainless steel is our most commonly sold medical stainless steel. Breaking down the name, this is a low-carbon version of 316 that has been vacuum arc remelted to reduce impurities. Beyond removing impurities, this process, in combination with the unique nickel and chromium content of 316, tends to facilitate the formation of the surface chromium oxide layer that makes stainless steel corrosion resistant. There is some belief that T-316 LVM forms a more substantial surface layer, and that this plays a strong role in protecting the host body from reactions to the nickel content of the material.

#### Technical Data

#### Available tube product forms

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

#### Typical manufacturing specifications

**ASTM A213, ASTM A269, ASTM A312, ASTM A632**

**Also individual customer specifications.**

#### Industries predominantly using this grade

**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	1321	1026	883	-	-	-
	6.35	603	448	369	283	-	-
	9.53	390	287	233	175	138	115
	12.7	-	211	171	126	98	<b>80</b>
	19.05	-	-	111	81	63	50
	25.4	-	-	-	60	46	37

can provide longer length according to customer requirement

#### Chemical composition(% by weight)

Element	C	Mn	P	S	Si	Ni	Cr	Mo	-	-	-	-
Minimum	-	-	-	-	-	14.5	16.0	2.2	-	-	-	-
Maximum	0.020	0.05	0.040	0.002	0.20	16.0	18.0	3.0	-	-	-	-
Aiming	0.005	0.009	0.003	0.0018	0.034	14.8	16.5	2.5	-	-	-	-

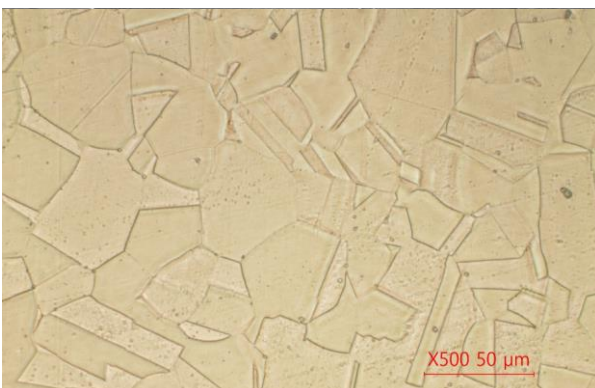
#### Mechanical Properties

	Specifications(Tubing, Annealed)		Actual data	
Tensile Rm	70	ksi (min.)	79~98	ksi
Tensile Rm	485	MPa (min.)	550~680	MPa
Yield (R.p. 0.2%)	25	ksi (min.)	31~50	ksi
Yield (R.p. 0.2%)	170	MPa (min.)	220~350	MPa
Elongation	35	% (min.)	45~58	%

#### Physical Properties(Room Temperature)

Specific Heat (0-100°C)	485	J.kg <sup>-1</sup> .°K <sup>-1</sup>
Thermal Conductivity	16.3	W.m <sup>-1</sup> .°K <sup>-1</sup>
Thermal Expansion	16.5	mm/m.°C
Modulus Elasticity	200	GPa
Electrical Resistivity	7.4	μohm.cm
Density	7.99	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	322	469	642	830	-	-	-
	9.53	207	297	409	539	723	-	-
	12.7	153	217	296	390	530	-	-
	19.05	-	141	191	249	336	-	-
	25.4	-	105	141	183	245	363	450
	31.8	-	-	111	144	192	283	349
	38.1	-	-	92	119	159	232	285
	50.8	-	-	69	89	117	171	209

\* We follow customer requested dimensions.

\* Select tubes according to design pressure