STAINLESS STEEL

ALLOYS 316 / 316L

SuperiorTube / AMETEK SPECIALTY METAL PRODUCTS

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

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 chromium-nickel austenitic stainless steels, 316L stainless steel offers higher creep, stress to rupture and tensile strength at elevated temperatures.

These alloys may be considered for a wide variety of applications where one or more properties are important.

AVAILABLE TUBE PRODUCT FORMS
STRAIGHT | COILED | SEAMLESS
SEAM WELDED AND COLD REDRAWN
SEAM WELDED, COLD REDRAWN AND ANNEALED

TYPICAL MANUFACTURING SPECIFICATIONS	
ASTM A213	ASME SA213
ASTM A269	NFA 49-117
ASTM A312	BS 10216
ASTM A632	
Also individual customer specifications.	

TYPICAL APPLICATIONS
PROCESS ENGINEERING
CONTROL LINES
HIGH PERFORMANCE LIQUID CHROMATOGRAPHY (HPLC)
HEAT EXCHANGERS
CONDENSERS
SEMICONDUCTORS
MEDICAL IMPLANTS (INCLUDING PINS, SCREWS AND IMPLANTS)

INDUSTRIES PREDOMINANTLY USING THIS GRADE	
OIL AND GAS	HIGH PERFORMANCE
CHEMICAL PROCESSES	COMMERCIAL

Technical Data

MECHANICAL PROPERTIES						
Temper	Annealed			Cold worked (approx. 20%)		
Material	316	316L		316	316L	
Tensile Rm	75	70	ksi (min)	102 - 131		ksi (min)
Tensile Rm	515	485	MPa (min)	700 - 900		MPa (min)
R.p. 0.2% Yield	30	27	ksi (min)	73 - 102		ksi(min)
R.p. 0.2% Yield	205	182	MPa (min)	500 - 700		MPa (min)
Elongation (2" or 4D gl)	35		% (min)	40		% (min)

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	µm/µm/°C
Modulus Elasticity	193	GPa
Electrical Resistivity	7.4	µohm/cm
Density	7.99	g/cm^3

CHEMICAL COMPOSITION (% by weight)				
	316		316L	
Element	Min	Max	Min	Max
C	-	0.08	-	0.035
Mn	-	2	-	2
Ni	10	14	10	15
Cr	16	18	16	18
Mo	2	3	2	3
S	-	0.03	-	0.03
Si	-	1	-	1
P	-	0.045	-	0.045