

Stainless steel

Alloys 904L

(UNS N08904)

Application

UNS N08904, commonly known as 904L, is a low carbon high alloy austenitic stainless steel which is widely used in applications where the corrosion properties of AISI 316L and AISI 317L are not adequate. The addition of copper to this grade gives it corrosion resistant properties superior to the conventional chrome nickel stainless steels, in particular to sulphuric, phosphoric and acetic acids. However, there is limited use with hydrochloric acids. It also has a high resistance to pitting in chloride solutions, a high resistance to both crevice and stress corrosion cracking. Alloy 904L performs better than other austenitic stainless steels due to the higher alloying of nickel and molybdenum. The grade is non-magnetic in all conditions and has excellent formability and weldability. The austenitic structure also gives this grade excellent toughness, even down to cryogenic temperatures. The high chromium content promotes and maintains a passive film which protects the material in many corrosive environments. 904L has a greater resistance to precipitation of ferrite and sigma phases on cooling and welding than other stainless steels containing molybdenum such as 316L and 317L. There is no risk of intercrystalline corrosion on cooling or welding due to the low carbon content. Its maximum service temperature is at 450°C. This grade is particularly useful in control and instrumentation tubing applications where 316 and 317L are not suitable.

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

Condensers, Heat exchangers, Control acid instrumentation

Chemical processes, Oil and gas, Pharmaceutical 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	2947	2288	1969	-	-	-
	6.35	1345	1000	824	632	-	-
	9.53	871	640	521	390	308	256
	12.7	-	470	381	282	220	179
	19.05	-	-	248	181	139	112
	25.4	-	-	-	134	102	81

can provide longer length according to customer requirement

Chemical composition(% by weight)

Element	C	Mn	P	S	Si	Ni	Cr	Mo	N	Cu	-	-
Minimum	-	-	-	-	-	23.0	19.0	4.0	-	1.00	-	-
Maximum	0.020	2.00	0.040	0.030	1.00	28.0	23.0	5.0	0.10	2.00	-	-

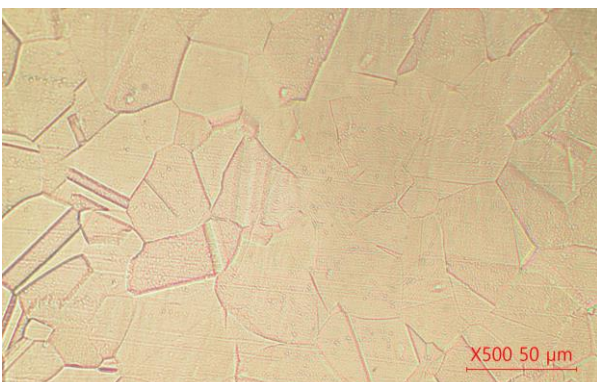
Mechanical Properties

	Specifications(Tubing, Annealed)		Actual data	
Tensile Rm	71	ksi (min.)	82~98	ksi
Tensile Rm	490	MPa (min.)	570~680	MPa
Yield (R.p. 0.2%)	31	ksi (min.)	40~53	ksi
Yield (R.p. 0.2%)	215	MPa (min.)	280~370	MPa
Elongation	35	% (min.)	41~48	%

Physical Properties(Room Temperature)

Specific Heat (0-100°C)	450	J.kg ⁻¹ .°K ⁻¹
Thermal Conductivity	11.5	W.m ⁻¹ .°K ⁻¹
Thermal Expansion	15.8	mm/m.°C
Modulus Elasticity	190	GPa
Electrical Resistivity	9.52	μohm.cm
Density	7.95	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	393	572	783	1012			
	9.53	253	362	499	657	883		
	12.7	186	265	362	476	646		
	19.05		172	233	304	410		
	25.4		128	172	223	299	443	549
	31.8			136	176	235	345	425
	38.1			113	146	194	283	348
	50.8			84	108	143	208	255

* We follow customer requested dimensions.

* Select tubes according to design pressure