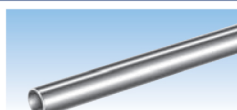


## Tubing

For safe, reliable and leak-free DK-Lok fitting system, tubing should be considered as one of fitting components.



- Tubing is assembled by simple wrench make-up on DK-Lok fitting. This results in less assembly and maintenance costs.
- Tubing assembly on DK-Lok fitting is re-usable.
- Tubing is bendable. It allows lower pressure drop with fewer connections. This in turn reduces system costs because of less fabricating manpower.
- Pipe threading or welding is difficult to disassemble and re-assemble
- Piping requires skilled worker for welding & threading

## Tubing Selection

### Hardness

- Tubing must be softer than fitting material. The metal tubing must be fully annealed and suitable for bending and flaring.
- Tubing hardness must be selected according to the information in the table 2 to 13.

### Surface

- Tubing must have a surface free from scratches, draw mark, dirt, dust and flat spots.

### Ovality

- Tubing in oval or out-of-roundness way not fit into the fitting. Do not force the tubing into the fitting; it may damage the fitting sealing system on nut, ferrules, and body.

### Wallthickness

- The table 2 to 13 list tubing working pressure ratings in a wide range of wall thickness. A too thin wall may collapse and a too thick wall may not properly be deformed by the ferrule action.
- Do not use tubing wall thickness not listed in the table 2 to 13.

### Weld tubing

- Welded tubing should have a not measurable bead on its outside diameter.

## Tubing Handling

Careful handling and storage practices will protect tubing from unnecessary scratches, nicks, or degrading the good tubing surface finish.

- Tubing ends should be capped so any foreign materials will not fall inside during transportation and storage.
- Do not drag across tubing rack, cement, gravel or any rough surface.
- Do use correct tube cutter for tube material. The wrong cutter may result in excessive deformation of the tube end.
- Do not cut deep with each turn of cutting.
- Tube cutters and hacksaws should be sharp enough.
- Hacksaw blades should have at least 32 teeth per inch.
- Do deburr tube ends before inserting in fittings.

## Tube Fitting Pressure Rating

- The pressure rating of DK-Lok Tube Fitting is rated to the working pressure of connective tubing.
- The allowable working pressure of tubing in various materials is listed in the table 2 to 13.

## Material

Using like tubing and fitting material is essential for leak-free sealing system.

Unlike material may have different mechanical properties that may adversely affect the fitting seal on tubing.

The only exception is copper tubing with brass DK-Lok fitting.

## Gas Application

DK-Lok tube fitting is designed for a wide range of leak-free application including gas leak proof and vacuum tight service.

Gases (helium, hydrogen, nitrogen, air, etc.) can escape even the most minute leak-path due to their very small molecules.

Tube therefore must be handled not to have scratches, draw mark, nicks, flat spots, dirt, and dust

Use NOT thin wall tubing for gas applications.

Heavier wall tubing resists the ferrule action whereas thin wall tubing may collapse with little resistance to ferrule action.

For Gas service, use the tubing wall listed on un-shadowed section in table 2 to 13.

## Vacuum Application

DK-Lok Tube Fittings have been proved to be excellent vacuum tight seal in many applications including analytical industry.

DK-Lok Tube Fittings comply with the leakage requirements of TA-LUFT 2002.

## Cryogenic Application

DK-Lok Fittings in SS316 Stainless Steel provide highly reliable performance on cryogenic application.

Cryogenic temperature is considered to be temperatures below -100°F (-73°C).

## High Pressure Application

Pressure 500 psig (34.5 bar) or higher is considered generally high pressure. In the high pressure system scratches, draw mark, nicks, flat spots, and dirt on tubing may cause leakage.

- For gas application, select the gas applicable tubing wall thickness from Table 2 to 13.
- Follow the suggestion on tubing selection, handling, and installation.

## Stainless Steel Tubing

Table 2. **Fractional Seamless Stainless Steel Tubing**

Fully annealed austenitic Type 304 or 316 seamless tubing ASTM A269 or ASTM A213, or equivalent. Tubing to be free from scratches, draw mark, dirt, dust, flat spots, and suitable for bending and flaring. Recommended hardness : 80 HRB or less.

OD in.	Wall Thickness (in.)														
	0.012	0.014	0.016	0.02	0.028	0.035	0.049	0.065	0.083	0.095	0.109	0.12	0.134	0.156	0.188
1/16	6800	8100	9400	12000											
1/8					8500	10900									
3/16					5400	7000	10200								
1/4					4000	5100	7500	10200							
5/16						4000	5800	8000							
3/8						3300	4800	6500	7500						
1/2						2400	3500	4700	6200						
5/8							2900	4000	5200	6000					
3/4							2400	3300	4200	4900	5800				
7/8							2000	2800	3600	4200	4800				
1								2400	3100	3600	4200	4700			
1 1/4									2400	2800	3300	3600	4100	4900	
1 1/2										2300	2700	3000	3400	4000	4900
2											2000	2200	2500	2900	3600

Table 3. **Metric Seamless Stainless Steel Tubing**

OD mm	Wall Thickness (mm)													
	0.8	1.0	1.2	1.5	1.8	2.0	2.2	2.5	2.8	3.0	3.5	4.0	4.5	
3	710													
6	330	420	520	670										
8	310		380	490										
10	240		300	380										
12	200		240	310	380	430	Working Pressure in bar							
14	180		220	280	340	390	430							
15	170		200	260	320	360	400							
16				190	240	300	330	370						
18				170	210	260	290	320	370					
20				150	190	230	260	290	330	380				
22				130	170	210	230	260	300	340				
25						180	200	230	260	300	320			
28							180	200	230	260	280	330		
30							170	190	210	240	260	310		
32							160	170	200	230	240	290	330	
38								140	170	190	200	240	280	310
50										150	180	210	240	

- According to the requirements of ASME B31.3 Process Piping Code and ASME B31.1 Power Piping Code, allowable working pressure calculated at -20 to 100°F (-28 to 37°C) using S value of 20,000 psi.
- Pressure calculations are based on **maximum O.D. and minimum wall thickness** and no allowance is made for corrosion and erosion. i.e., ASTM A269 1/2 in. OD x 0.035 in. WT: OD tolerance ± 0.005 in., WT tolerance ± 15%. Calculations are based on 0.505 in. OD x 0.0298 in. WT.
- Safety Factor is 3.75 to 1, considering ultimate tensile strength of 75,000 psi.

## Weld Stainless Steel Tubing Allowable Working Pressure

To determine the working pressure of weld tubing to the requirements of ASME B31.3 Code, de-rating factors below must be applied. For single weld tubing multiply by 0.80, and for double weld tubing multiply by 0.85.

Example: SS316 seamless 1/2 in. O.D. x 0.065 in. WT allowable working pressure: 4700 psi.

To determine the work pressure of the single weld tubing, multiply 4700 psi by 0.80.  
4700 psig x 0.80 = 3760 psig at -20 to 100°F (-28 to 37°C).

## Temperature De-rating Factors

The pressure rating of the Lok port is governed by the connective tubing pressure rating.

To determine allowable working pressure at elevated temperature, multiply working pressure by applicable factor shown in table 14.

Example: SS316 seamless tubing 1/2 in. O.D. x 0.065 in. WT at 700 °F. 4700 psig x 0.82 = 3854 psi.

Allowable working pressure of SS316 seamless 1/2 in. O.D. x 0.065 in. WT is 3854 psi at 700 °F.

Table 14.

Temp.		Stainless		C.steel	Copper	825	C276	625	20	400	Super Duplex
°F	°C	304	316	A179	B75	B423	B622	B444	B729	B165	A789
100	38	1	1	1	1	1	1	1	1	1	1
200	93	1	1	0.96	0.8	0.92	1	1	0.9	0.88	0.9
300	149	1	1	0.9	0.78	0.87	1	1	0.86	0.79	0.85
400	204	0.94	0.97	0.86	0.5	0.83	1	1	0.83	0.79	0.82
500	260	0.88	0.9	0.82	0.13	0.79	0.98	0.97	0.79	0.79	0.81
600	316	0.82	0.85	0.77		0.76	0.93	0.95	0.77	0.79	0.8
700	371	0.8	0.82	0.73		0.74	0.87	0.93	0.76	0.79	
800	427	0.76	0.8	0.59		0.73	0.84	0.93	0.73	0.76	
900	482	0.73	0.78			0.73	0.81	0.93	0.73	0.76	
1000	538	0.69	0.77			0.71	0.79	0.93			
1200	649	0.3	0.37			0.35	0.33				