Tubing and Pipes

FITOK
Valves and Fittings

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Tubing Selection

Proper selection, handling, and installation of tubing, when combined with proper selection of FITOK tube fittings, are essential for reliable tubing systems.
The following variables should be considered when ordering tubing for use with FITOK tube fittings:

◎ Surface finish
◎ Material
◎ Hardness
◎ Wall thickness

Surface Finish

Surface finish is very important to proper sealing. Tubing with any kind of depression, scratch, raised portion, or other surface defect will be difficult to seal, particularly in gas service.

Material

Metal tubing material should be softer than fitting material. For example, stainless steel tubing should not be used with brass fittings. When tubing and fittings are made of the same material, tubing must be fully annealed.

Hardness

FITOK tube fittings are designed to work properly with the tubing that is suggested in the ordering instructions. FITOK stainless steel tube fittings have been repeatedly tested successfully with tubing with hardness up to 200 HV and 90 HRB.

Wall Thickness

The accompanying tables show working pressure ratings of tubing in a wide range of wall thicknesses. Except as noted, allowable pressure ratings are calculated from S values as specified by ASME B31.3, Process Piping. FITOK tube fittings have been repeatedly tested in both the minimum and maximum wall thicknesses shown. FITOK tube fittings are not recommended for tube wall thicknesses outside the ranges shown in the accompanying tables for each size.

Tubing Handling

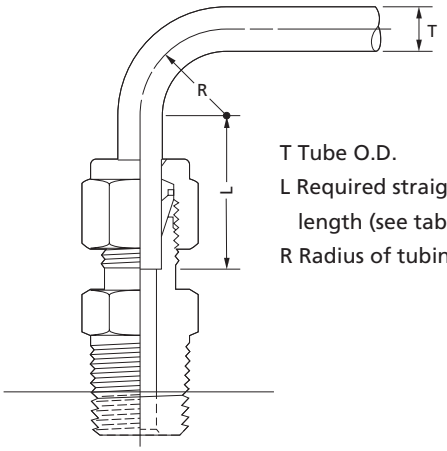
It is important to properly handle the tubing in order to reduce the scratches and protect the surface finish.

◎ Tubing should never be dragged out of a tubing rack or across a rough surface.
◎ Tube cutters or hacksaws should be sharp. Do not take deep cuts with each turn of the cutter or stroke of the saw. The tubing will go all the way through the ferrules without damaging the ferrule sealing edge.

Gas Service

Gases (air, hydrogen, helium, nitrogen, etc.) have very small molecules that can escape through even the most minute leak path. Some surface defects on the tubing can provide such a leak path. As tube outside diameter (O.D.) increases, so does the likelihood of a scratch or other surface defect interfering with proper sealing.
The most successful connection for gas service will occur if all installation instructions are carefully followed and the heavier wall thicknesses of tubing on the accompanying tables are selected.

Tubing Installation



T Tube O.D.
L Required straight tube length (see tables)
R Radius of tubing bend

Tubing properly selected and handled, combined with properly installed FITOK tube fittings, will give you a leaktight system and provide reliable service in a wide variety of applications.
For maximum assurance of reliable performance, use:

- ◎ Properly selected and handled high-quality tubing —such as provided by FITOK.
- ◎ FITOK tube fittings assembled in accordance with catalog instructions.
- ◎ An appropriate tube support system to limit the movement of tubing and fluid system components.

When installing fittings near tube bends, there must be a sufficient straight length of tubing to allow the tube to be bottomed in the FITOK fitting (see tables).

Fractional, in.	
T Tube O.D.	L①
1/16	1/2
1/8	23/32
3/16	3/4
1/4	13/16
5/16	7/8
3/8	15/16
1/2	1 3/16
5/8	1 1/4
3/4	
7/8	1 5/16
1	1 1/2
1 1/4	2
1 1/2	2 13/32
2	3 1/4

① Required straight tube length.

Metric, mm	
T Tube O.D.	L①
3	19
6	21
8	23
10	25
12	31
14	32
15	
16	
18	
20	34
22	
25	40
28	46
30	50
32	54
38	63
50	80

Suggested Allowable Working Pressure Tables

Figures and tables are for reference only. No implication is made that these values can be used for design work. Applicable codes and practices in industry should be considered.

- ◎ All pressures are calculated from equations in ASME B31.3, Process Piping. See factors for calculating working pressures in accordance with ASME B31.1, Power Piping.
- ◎ Calculations are based on maximum O.D. and mimimum wall thickness, except as noted in individual tables.
  Example: 1/2 in. O.D.×0.049 in. wall thickness stainless steel tubing purchased to ASTM A269:
  O.D. Tolerance ±0.005 in. / Wall Thickness Tolerance ±10%
  Calculations are based on 0.505 in.O.D.×0.0441 in. wall thickness tubing.
- ◎ No allowance is made for corrosion or erosion.

Suggested Allowable Working Pressure for Stainless Steel Tubing

Table 1 — Fractional Stainless Steel Seamless Tubing

Allowable working pressures are calculated from an S value of 20 000 psi (137.8 MPa) for ASTM A269 tubing at -20 to 100°F (-28 to 37°C), as listed in ASME B31.3, except as noted. Multiply stainless steel rating by 0.94 for working pressure in accordance with ASME B31.1.

For Welded Tubing

For welded and drawn tubing, a derating factor must be applied for weld integrity:

- For double-welded tubing, multiply working pressure by 0.85.
- For single-welded tubing, multiply working pressure by 0.80.

Tube O.D. (in.)	Nominal Wall Thickness, in.															
	0.010	0.012	0.014	0.016	0.020	0.028	0.035	0.049	0.065	0.083	0.095	0.109	0.120	0.134	0.156	0.188
	Working Pressure, psig															
1/16	5600	6800	8100	9400	12000											
1/8						8500	10900									
3/16						5400	7000	10200								
1/4						4000	5100	7500								
5/16							4000	5800	8000							
3/8							3300	4800	6500							
1/2							2600	3700	5100	6700						
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

Note: For gas service, select a tube thickness outside of the shaded area.

Suggested Ordering Information

High-quality, fully annealed (Type 304/304L, 316/316L) (seamless or welded and drawn) stainless steel hydraulic tubing, ASTM A269 or A213, or equivalent. Hardness not to exceed 90 HRB or 200 HV. Tubing to be free of scratches, suitable for bending and flaring. O.D. tolerances not to exceed ±0.003 in. for 1/16 in. O.D. tubing.

Note: Certain austenitic stainless tubing has an allowable ovality tolerance double the O.D. tolerance and may not fit into FITOK precision tube fittings. Dual-certified grades such as 304/304L and 316/316L meet the minimum chemistry and the mechanical properties of both alloy grades.

Table 2—Metric Stainless Steel Seamless Tubing

Allowable working pressures are based on equations from ASME B31.3 for EN ISO 1127 tubing (D4, T4 tolerance for 3 to 12 mm; D4, T3 tolerance 14 to 50 mm), using a stress value of 137.8 MPa (20 000 psi) and tensile strength of 516.4 MPa (74 900 psi), except as noted. Multiply stainless steel rating by 0.94 for working pressure in accordance with ASME B31.1.

For Welded Tubing

For welded and drawn tubing, a derating factor must be applied for weld integrity:

- For double-welded tubing, multiply working pressure by 0.85.
- For single-welded tubing, multiply working pressure by 0.80.

Tube O.D. (mm)	Nominal 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	4.5
	Working Pressure, bar													
3	670													
6	310	420	540	710										
8		310	390	520										
10		240	300	400	510	580								
12		200	250	330	410	470								
14		160	200	270	340	380	430							
15		150	190	250	310	360	400							
16			170	230	290	330	370	400						
18			150	200	260	290	320	370						
20			140	180	230	260	290	330	380					
22			140	160	200	230	260	300	340					
25					180	200	230	260	290	320				
28						180	200	230	260	280	330			
30						170	180	210	240	260	310			
32						160	170	200	220	240	290	330		
38							140	160	190	200	240	270	310	

Note: For gas service, select a tube thickness outside of the shaded area.

Suggested Ordering Information

High-quality, fully annealed (Type 304/304L, 316/316L) stainless steel tubing, EN ISO 1127 or equivalent. Hardness not to exceed 90 HRB or 200 HV. Tubing to be free of scratches, suitable for bending and flaring. O.D. tolerances not to exceed ±0.076 mm for 3 mm O.D. tubing.
Note: Dual-certified grades such as 304/304L, 316/316L meet the minimum chemistry and the mechanical properties of both alloy grades.

BA (Bright Annealing) Tubing

Features: Finish-rolling with bright annealing treatment, achieving good internal surface finish; Hardness under HRB90; Low carbon, high nickel, high chromium and molybdenum, better corrosion resistance; Close dimensional tolerance, better consistency in application; Longer service life in marine environment application; Applicable to clean industry, such as semiconductor, biological pharmaceuticals, food processing and other fields.

Composition:

Material	Chemical Component							
	C	Mn	P	S	Si	Ni	Cr	Mo
316/316L	≤0.03	≤2.00	≤0.04	≤0.03	≤0.75	12.0-14.0	17.0-18.0	2.50-3.00

Internal Surface States:

Dimension in. (mm)	Internal Surface Finish	
	Ra (μm)	Ra (μinch)
1/8 (3)≤OD≤2 (50)	≤0.38	≤15

MP (Mechanical Polishing) Tubing

Features: Cold drawn and with mechanical polishing, acid pickling of internal surface; Hardness under HRB90.
Composition: In accordance with the standard requirements, please refer to the corresponding standard.
Dimensions and Tolerance: In accordance with the standard requirements, please refer to the corresponding standard.
Internal surface state: acid pickling, surface finish Ra≤3.2 μm.

Suggested Allowable Working Pressure for Carbon Steel Tubing

Table 3 — Fractional Carbon Steel Tubing

Allowable working pressures are calculated from an S value of 15 700 psi (108.2 MPa) for ASTM A179 tubing at -20 to 100°F (-28 to 37°C), as listed in ASME B31.3. For working pressure in accordance with ASME B31.1, multiply by 0.85.

Tube O.D. (in.)	Tube Wall Thickness, in.												
	0.028	0.035	0.049	0.065	0.083	0.095	0.109	0.120	0.134	0.148	0.165	0.180	0.220
	Working Pressure, psig												
1/8	8000	10200											
3/16	5100	6600	9600										
1/4	3700	4800	7000	9600									
5/16		3700	5500	7500									
3/8		3100	4500	6200									
1/2		2300	3200	4500	5900								
5/8		1800	2600	3500	4600	5300							
3/4			2100	2900	3700	4300	5100						
7/8			1800	2400	3200	3700	4300						
1			1500	2100	2700	3200	3700	4100					
1 1/4				1600	2100	2500	2900	3200	3600	4000	4600	5000	
1 1/2					1800	2000	2400	2600	2900	3300	3700	4100	5100

Note: For gas service, select a tube thickness outside of the shaded area.

Suggested Ordering Information

High-quality, soft annealed seamless carbon steel hydraulic tubing, ASTM A179 or equivalent. Hardness not to exceed 72 HRB or 130 HV. Tubing to be free of scratches, suitable for bending and flaring.

Table 4 — Metric Carbon Steel Tubing

Allowable working pressures are based on equations from ASME B31.3 for DIN 2391 tubing, using a stress value of 113 MPa (16 300 psi) and tensile strength of 340 MPa (49 300 psi).

Tube O.D. (mm)	Tube 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
	Working Pressure, bar												
3	630	790											
6	290	370	460	590									
8		270	330	430									
10		210	260	330									
12		170	210	270	330	380	420						
14		150	180	230	280	320	350						
15		140	170	210	260	290	330						
16		130	150	200	240	270	300	350					
18			140	170	210	240	270	310					
20			120	160	190	210	240	270	310				
22			110	140	170	190	210	240	280				
25			100	120	150	170	180	210	240	260			
28						150	160	190	210	230	270		
30						140	150	170	200	210	250		
32						130	140	160	180	200	230	270	
38							120	130	150	160	190	230	260

Note: For gas service, select a tube thickness outside of the shaded area.

Suggested Ordering Information

High-quality, soft annealed carbon steel tubing, DIN 2391 or equivalent. Hardness not to exceed 72 HRB or 130 HV. Tubing to be free of scratches, suitable for bending and flaring.

Suggested Allowable Working Pressure for Copper Tubing

Allowable working pressures are calculated from an S value of 6000 psi (41.3 MPa) for ASTM B75 (B75M) and ASTM B88 (B88M) tubing at -20 to 100°F (-28 to 37°C), as listed in ASME B31.3 and ASME B31.1.

Table 5 — Fractional Copper Tubing

Tube O.D. (in.)	Tube Wall Thickness, in.									
	0.028	0.030	0.035	0.049	0.065	0.083	0.095	0.109	0.120	0.134
	Working Pressure, psig									
1/8	2700	3000	3600							
3/16	1800	1900	2300	3400						
1/4	1300	1400	1600	2500	3500					
5/16			1300	1900	2700					
3/8			1000	1600	2200					
1/2			800	1100	1600	2100				
5/8				900	1200	1600	1900			
3/4				700	1000	1300	1500	1800		
7/8				600	800	1100	1300	1500		
1				500	700	900	1100	1300	1500	
1 1/8					600	800	1000	1100	1300	1400

Note: For gas service, select a tube thickness outside of the shaded area.

Table 6 — Metric Copper Tubing

Tube O.D. (mm)	Tube Wall Thickness, mm									
	0.8	1.0	1.2	1.5	1.8	2.0	2.2	2.5	2.8	3.0
	Working Pressure, bar									
6	110	140	170	220						
8		100	120	160						
10		80	100	130						
12		60	80	100	130	140				
14		50	60	90	110	120	130			
15			60	80	100	110	120			
16				70	90	100	110	120		
18				60	80	90	100	110		
20				60	70	80	90	100	110	
22				50	60	70	80	90	100	
25				40	50	60	70	80	90	100
28					40	50	60	70	80	90

Note: For gas service, select a tube thickness outside of the shaded area.

Suggested Ordering Information

High-quality, soft annealed seamless copper tubing, ASTM B75 (B75M) or equivalent. Also soft annealed (Temper O) copper water tube, type K or type L to ASTM B88 (type A or type B to ASTM B88M).

Suggested Allowable Working Pressure for Additional Alloys

A limited amount of test data is available on FITOK tube fittings used with special alloy tubing. For sizes not listed in the following tables, we recommend that a sample of the tubing be provided for evaluation before installation. Please include all pertinent information relating to system parameters. Give tubing sample to any of authorized FITOK representatives to forward to the factory.

Alloy 400 Tubing

Allowable working pressures are calculated from an S value of 18 700 psi (128.9 MPa) for ASTM B165 tubing at -20 to 100°F (-28 to 37°C), as listed in ASME B31.3 and ASME B31.1.

Table 7 — Fractional

Tube O.D. (in.)	Tube Wall Thickness, in.							
	0.028	0.035	0.049	0.065	0.083	0.095	0.109	0.120
	Working Pressure, psig							
1/8	7900	10 100						
1/4	3700	4 800	7000	9500				
5/16		3 700	5400	7300				
3/8		3 100	4400	6100				
1/2		2 300	3200	4400				
3/4			2200	3000	4000	4600		
1				2200	2900	3400	3900	4300

Note: For gas service, select a tube thickness outside of the shaded area.

Table 8 — Metric

Tube O.D. (mm)	Tube Wall Thickness, mm									
	0.8	1.0	1.2	1.5	1.8	2.0	2.2	2.5	2.8	3.0
	Working Pressure, bar									
6	310	390	490	620						
8		290	350	450						
10		220	280	350						
12		180	230	290						
14		160	190	240	270					
18			150	200	240	270	300			
20				180	210	240	270	290		
25					170	190	210	240	270	290

Note: For gas service, select a tube thickness outside of the shaded area.

Suggested Ordering Information

High-quality, fully annealed seamless alloy 400 hydraulic tubing, ASTM B165 or equivalent. Hardness not to exceed 75 HRB or 137 HV. Tubing to be free of scratches, suitable for bending and flaring. O.D. tolerances not to exceed ±0.005 in (±0.13 mm).

Alloy C-276 Tubing

Allowable working pressures are based on equations from ASME B31.3 and ASME B31.1 for a maximum S value of 20 000 psi (137.8 MPa).

Table 9 — Fractional

Tube O.D. (in.)	Tube Wall Thickness, in.			
	0.028	0.035	0.049	0.065
	Working Pressure, psig			
1/4	4000	5100	7500	1 0200
5/16		4000	5800	7 800
3/8		3300	4800	6 500
1/2		2600	3700	5 100

Note: For gas service, select a tube thickness outside of the shaded area.

Table 10 — Metric

Tube O.D. (mm)	Tube Wall Thickness, mm			
	0.8	1.0	1.2	1.5
	Working Pressure, bar			
6	310	420	520	670
8		310	390	500
10		240	300	380
12		200	240	310

Note: For gas service, select a tube thickness outside of the shaded area.

Suggested Ordering Information

High-quality, fully annealed alloy C-276 tubing, ASTM B622 or equivalent. Hardness not to exceed 100 HRB or 248 HV. Tubing to be free of scratches, suitable for bending and flaring. O.D. tolerances not to exceed ±0.005 in (±0.13 mm).

Alloy 20 Tubing

Allowable working pressures are based on equations from ASME B31.3 and ASME B31.1 for a maximum S value of 20 000 psi (137.8 MPa).

Table 11 — Fractional

Tube O.D. (in.)	Tube Wall Thickness, in.			
	0.028	0.035	0.049	0.065
	Working Pressure, psig			
1/4	4000	5100	7500	1 0200
3/8		3300	4800	6 500
1/2		2600	3700	5 100

Note: For gas service, select a tube thickness outside of the shaded area.

Table 12 — Metric

Tube O.D. (mm)	Tube Wall Thickness, mm			
	0.8	1.0	1.2	1.5
	Working Pressure, bar			
6	310	420	520	670
10		240	300	380
12		200	240	310

Note: For gas service, select a tube thickness outside of the shaded area.

Suggested Ordering Information

High-quality, fully annealed seamless or welded and drawn alloy 20 tubing, ASTM B729, B468 or equivalent. Hardness not to exceed 95 HRB. Tubing to be free of scratches, suitable for bending and flaring. O.D. tolerances not to exceed ±0.005 in (±0.13 mm).

Alloy 600 Tubing

Allowable working pressures are based on equations from ASME B31.3 and ASME B31.1 for a maximum S value of 20 000 psi (137.8 MPa).

Table 13 — Fractional

Tube O.D. (in.)	Tube Wall Thickness, in.			
	0.028	0.035	0.049	0.065
	Working Pressure, psig			
1/4	4000	5100	7500	10200
3/8		3300	4800	6500
1/2		2600	3700	5100

Note: For gas service, select a tube thickness outside of the shaded area.

Table 14 — Metric

Tube O.D. (mm)	Tube Wall Thickness, mm			
	0.8	1.0	1.2	1.5
	Working Pressure, bar			
6	310	420	520	670
10		240	300	380
12		200	240	310

Note: For gas service, select a tube thickness outside of the shaded area.

Suggested Ordering Information

High-quality, fully annealed, cold drawn #1 temper alloy 600 seamless alloy tubing, ASTM B167 or equivalent. Hardness not to exceed 92 HRB or 198 HV. Tubing to be free of scratches, suitable for bending and flaring. Order to outside diameter and wall thickness only, not to inside diameter, average wall specification. O.D. tolerances not to exceed ±0.005 in (±0.13 mm).

Grade 2 Titanium Tubing

Allowable working pressures are based on equations from ASME B31.3 and a maximum S value of 16 700 psi (115.1 MPa) for ASTM B338 tubing at -20 to 100°F (-28 to 37°C). For working pressure in accordance with ASME B31.1, multiply by 0.85.

Table 15 — Fractional

Tube O.D. (in.)	Tube Wall Thickness, in.			
	0.028	0.035	0.049	0.065
	Working Pressure, psig			
1/4	3500	4500	6700	9100
3/8		2900	4200	5800
1/2		2100	3100	4200

Note: For gas service, select a tube thickness outside of the shaded area.

Table 16 — Metric

Tube O.D. (mm)	Tube Wall Thickness, mm			
	0.8	1.0	1.2	1.5
	Working Pressure, bar			
6	290	380	470	600
10		210	260	340
12		180	220	280

Note: For gas service, select a tube thickness outside of the shaded area.

Suggested Ordering Information

High-quality, fully annealed seamless or welded and drawn grade 2 titanium tubing, ASTM B338 or equivalent. Tubing to be free of scratches, suitable for bending. O.D. tolerances not to exceed ±0.005 in (±0.13 mm).

Table 17 — Fractional SAF 2507 Super Duplex Tubing

Allowable working pressures are calculated from an S value of 38 700 psi (266.8 MPa) for ASTM A789 tubing at -20 to 100°F (-28 to 37°C), as listed in ASME B31.3.

Tube O.D. (in.)	Tube Wall Thickness, in.				
	0.035	0.049	0.065	0.083	0.095
	Working Pressure, psig				
1/4	10 000	15 000			
3/8	6 500	10 100	12 700		
1/2	5 000	7 200	10 100	12 900	
5/8		5 800	7 600	10 100	
3/4		4 700	6 300	8 500	10 000

Note: For gas service, select a tube thickness outside of the shaded area.

Suggested Ordering Information

High-quality, fully annealed SAF 2507 super duplex tubing, ASTM A789 or equivalent. Hardness not to exceed 32 HRC. Tubing to be free of scratches, suitable for bending and flaring.

Alloy 825 Tubing

Allowable working pressures are calculated from an S value of 23 300 psi (160.6 MPa) for ASTM B163 and ASTM B423 seamless tubing at -20 to 100°F (-28 to 37°C), For ASTM B704, Class 1 or equivalent welded and drawn tubing, multiply working pressure by 0.85.

Table 18 — Fractional

Tube O.D. (in.)	Tube Wall Thickness, in.		
	0.035	0.049	0.065
	Working Pressure, psig		
1/4	6400	9300	11 600
3/8	4100	5900	8 200
1/2	3000	4300	5 900

Table 19 — Metric

Tube O.D. (in.)	Tube Wall Thickness, mm				
	0.8	1.0	1.2	1.5	1.8
	Working Pressure, bar				
6	410	530	660		
10		300	370	480	
12		250	300	390	480

Suggested Ordering Information

High-quality, fully annealed seamless alloy 825 tubing, ASTM B163, ASTM B423, or equivalent. Fully annealed welded alloy 825 tubing, ASTM B704, class 1 or equivalent. Hardness not to exceed HR15T90 or 201 HV. Tubing to be free of scratches, suitable for bending and flaring. Wall thickness tolerances not to exceed ±10%.

Alloy 625 Tubing

Allowable working pressures are calculated from an S value of 26 700 psi (184.1 MPa) for ASTM B444 Grade 2 tubing at -20 to 100°F (-28 to 37°C), tubing outside diameter and wall thickness tolerances from ASTM B444 for small-diameter tube.

Table 20 — Fractional

Tube O.D. (in.)	Tube Wall Thickness, in.		
	0.035	0.049	0.065
	Working Pressure, psig		
1/4	7300	10 700	14 600
3/8	4700	6 800	9 400
1/2	3500	5 000	6 800

Table 21 — Metric

Tube O.D. (mm)	Tube Wall Thickness, mm				
	0.8	1.0	1.2	1.5	1.8
	Working Pressure, bar				
6	470	610	750		
10		350	430	550	
12		290	350	450	550

Suggested Ordering Information

High-quality, fully annealed seamless alloy 625 tubing, ASTM B444, Grade 1 or 2, or equivalent. Hardness not to exceed 25 HRC or 266 HV. Tubing to be free of scratches, suitable for bending and flaring.

Pressure Ratings at Elevated Temperatures

Table 22 — Elevated Temperature Factors

Temperature		Tubing Materials											
°F	°C	Copper	Carbon Steel ①	304/304L②	316/316L②	Alloy 400	Alloy 20③	Alloy C–276③	Alloy 600③	Ti	SAF 2507	Alloy 825	Alloy 625
200	93	0.80	0.95	1.00	1.00	0.87	1.00	1.00	1.00	0.86	0.90	1.00	0.93
400	204	0.50	0.87①	0.93	0.96	0.79	0.96	0.96	0.96	0.61	0.82	0.90	0.85
600	315			0.82	0.85	0.79	0.85	0.85	0.85	0.45	0.80	0.84	0.79
800	426			0.76	0.79	0.75	0.79	0.79	0.79			0.81	0.75
1000	537			0.69	0.76			0.76	0.35				0.73

① Based on 375°F (190°C) max.
② Dual-certified grades such as 304/304L and 316/316L meet the minimum chemistry and the mechanical properties of both alloy grades.
③ Based on the lower derating factor for stainless steel, in accordance with ASME B31.3.

To determine allowable working pressure at elevated temperatures, multiply allowable working pressures from Tables 1 through 21 by a factor shown in Table 22.

Example: Type 316/316L stainless steel 1/2 in. O.D. × 0.035 in. wall at 1000°F

1. The allowable working pressure at -20 to 100°F (-28 to 37°C) is 2600 psig (Table 1, page 3).
2. The elevated temperature factor for 1000°F (537°C) is 0.76 (Table 22, above):
   2600 psig × 0.76 = 1976 psig

The allowable working pressure for 316/316L 1/2 in. O.D. × 0.035 in. wall tubing at 1000°F (537°C) is 1976 psig.

Ordering Information

Base Ordering Number

Fractional Stainless Steel Tubing

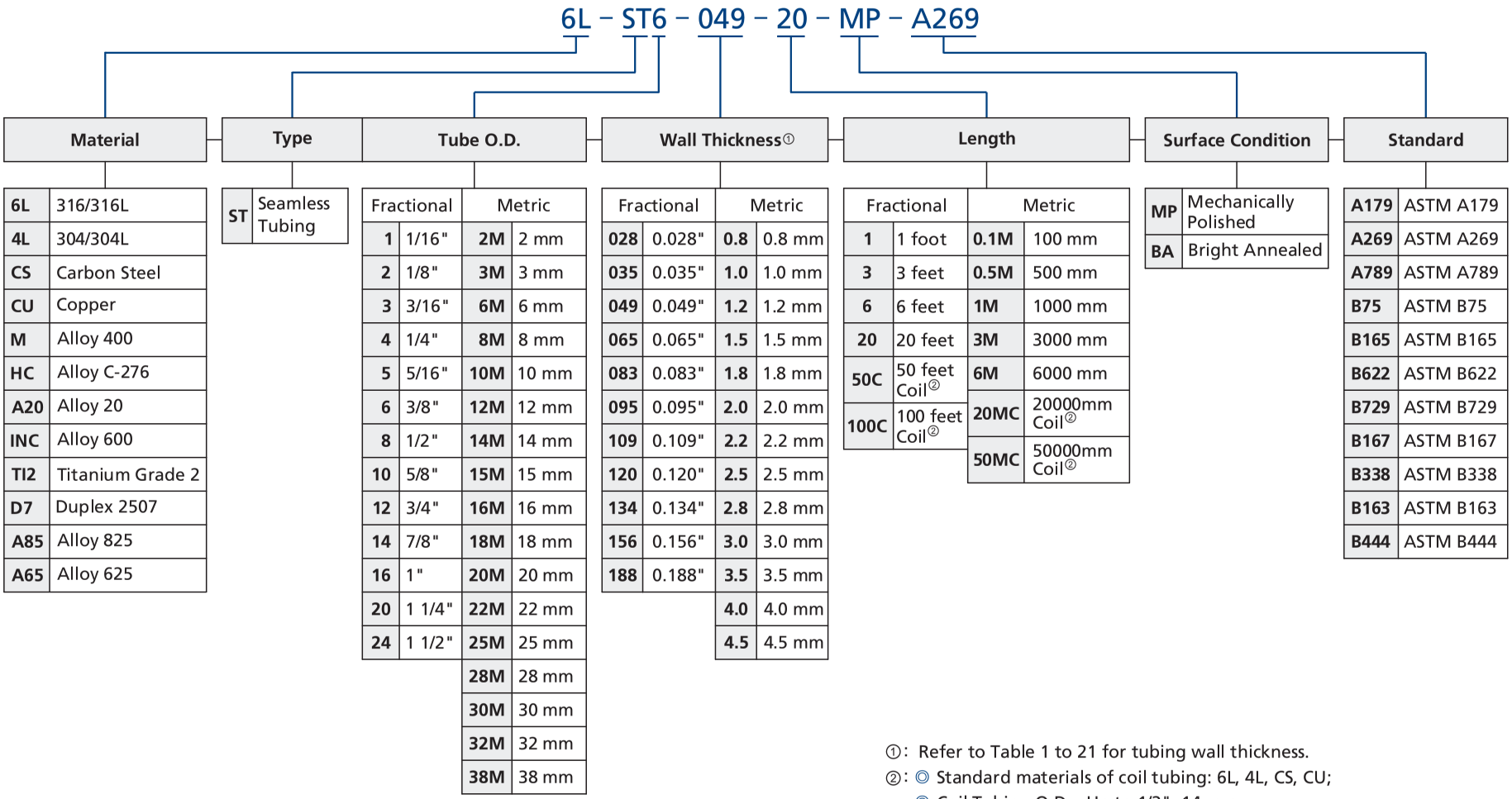
Tube O.D. (in.)	Wall Thickness (in.)	Basic Ordering Number		Weight
		316/316L	304/304L	lb/ft
1/4	0.035	6L-ST4-035-	4L-ST4-035-	0.082
	0.049	6L-ST4-049-	4L-ST4-049-	0.107
3/8	0.049	6L-ST6-049-	4L-ST6-049-	0.173
	0.065	6L-ST6-065-	4L-ST6-065-	0.219
1/2	0.049	6L-ST8-049-	4L-ST8-049-	0.240
	0.065	6L-ST8-065-	4L-ST8-065-	0.307
3/4	0.065	6L-ST12-065-	4L-ST12-065-	0.484
1	0.083	6L-ST16-083-	4L-ST16-083-	0.827
1 1/2	0.134	6L-ST24-134-	4L-ST24-134-	1.989

Metric Stainless Steel Tubing

Tube O.D. (mm)	Wall Thickness (mm)	Basic Ordering Number		Weight
		316/316L	304/304L	Kg/m
6	1.0	6L-ST6M-1.0-	4L-ST6M-1.0-	0.125
8	1.0	6L-ST8M-1.0-	4L-ST8M-1.0-	0.175
10	1.0	6L-ST10M-1.0-	4L-ST10M-1.0-	0.226
	1.5	6L-ST10M-1.5-	4L-ST10M-1.5-	0.320
12	1.5	6L-ST12M-1.5-	4L-ST12M-1.5-	0.395
	2.0	6L-ST12M-2.0-	4L-ST12M-2.0-	0.501
14	1.5	6L-ST14M-1.5-	4L-ST14M-1.5-	0.470
	2.0	6L-ST14M-2.0-	4L-ST14M-2.0-	0.602
16	1.5	6L-ST16M-1.5-	4L-ST16M-1.5-	0.545
	2.0	6L-ST16M-2.0-	4L-ST16M-2.0-	0.702
18	1.5	6L-ST18M-1.5-	4L-ST18M-1.5-	0.620
	2.0	6L-ST18M-2.0-	4L-ST18M-2.0-	0.802
20	2.0	6L-ST20M-2.0-	4L-ST20M-2.0-	0.903
25	2.5	6L-ST25M-2.5-	4L-ST25M-2.5-	1.410
28	2.8	6L-ST28M-2.8-	4L-ST28M-2.8-	1.769
30	3.0	6L-ST30M-3.0-	4L-ST30M-3.0-	2.031
32	3.5	6L-ST32M-3.5-	4L-ST32M-3.5-	2.501
38	4.0	6L-ST38M-4.0-	4L-ST38M-4.0-	3.410

Weight unit conversion:
1 lb/ft=1.488 Kg/m 1 Kg/m=0.672 lb/ft

Part Number Description



Material	
6L	316/316L
4L	304/304L
CS	Carbon Steel
CU	Copper
M	Alloy 400
HC	Alloy C-276
A20	Alloy 20
INC	Alloy 600
TI2	Titanium Grade 2
D7	Duplex 2507
A85	Alloy 825
A65	Alloy 625

Type	
ST	Seamless Tubing

Tube O.D.			
Fractional		Metric	
1	1/16"	2M	2 mm
2	1/8"	3M	3 mm
3	3/16"	6M	6 mm
4	1/4"	8M	8 mm
5	5/16"	10M	10 mm
6	3/8"	12M	12 mm
8	1/2"	14M	14 mm
10	5/8"	15M	15 mm
12	3/4"	16M	16 mm
14	7/8"	18M	18 mm
16	1"	20M	20 mm
20	1 1/4"	22M	22 mm
24	1 1/2"	25M	25 mm
		28M	28 mm
		30M	30 mm
		32M	32 mm
		38M	38 mm

Wall Thickness①			
Fractional		Metric	
028	0.028"	0.8	0.8 mm
035	0.035"	1.0	1.0 mm
049	0.049"	1.2	1.2 mm
065	0.065"	1.5	1.5 mm
083	0.083"	1.8	1.8 mm
095	0.095"	2.0	2.0 mm
109	0.109"	2.2	2.2 mm
120	0.120"	2.5	2.5 mm
134	0.134"	2.8	2.8 mm
156	0.156"	3.0	3.0 mm
188	0.188"	3.5	3.5 mm
		4.0	4.0 mm
		4.5	4.5 mm

Length			
Fractional		Metric	
1	1 foot	0.1M	100 mm
3	3 feet	0.5M	500 mm
6	6 feet	1M	1000 mm
20	20 feet	3M	3000 mm
50C	50 feet Coil②	6M	6000 mm
100C	100 feet Coil②	20MC	20000mm Coil②
		50MC	50000mm Coil②

Surface Condition	
MP	Mechanically Polished
BA	Bright Annealed

Standard	
A179	ASTM A179
A269	ASTM A269
A789	ASTM A789
B75	ASTM B75
B165	ASTM B165
B622	ASTM B622
B729	ASTM B729
B167	ASTM B167
B338	ASTM B338
B163	ASTM B163
B444	ASTM B444

①: Refer to Table 1 to 21 for tubing wall thickness.

②: ◎ Standard materials of coil tubing: 6L, 4L, CS, CU;
◎ Coil Tubing O.D. : Up to 1/2", 14 mm;
◎ For coil tubing of other materials, O.D. or length, please contact FITOK group or authorized agent.

Note: "Part Number Description" is used for composition rules of FITOK product model, Not suitable for specific product part number selection, not random combinations. If in doubt, please contact FITOK group or authorized agent.

Stainless Steel Seamless Pipe

Features

- Nominal pipe sizes from NPS 1/8 to NPS 2.
- Material, size, specification and heat code are indicated on the pipe surface.

Pipe Dimension

NPS	Outside Diameter		Schedule Number																	
			5S	5	10S	10	20	30	40S	40	STD	60	80S	80	XS	100	120	140	160	XXS
	in.	mm	Nominal Wall Thickness, mm																	
1/8	0.405	10.287			1.245	1.245		1.448	1.727	1.727	1.727		2.413	2.413	2.413					
1/4	0.540	13.716			1.651	1.651		1.854	2.235	2.235	2.235		3.023	3.023	3.023					
3/8	0.675	17.145			1.651	1.651		1.854	2.311	2.311	2.311		3.200	3.200	3.200					
1/2	0.840	21.336	1.651	1.651	2.108	2.108		2.413	2.769	2.769	2.769		3.734	3.734	3.734				4.775	7.468
3/4	1.050	26.670	1.651	1.651	2.108	2.108		2.413	2.870	2.870	2.870		3.912	3.912	3.912				5.563	7.823
1	1.315	33.401	1.651	1.651	2.769	2.769		2.900	3.378	3.378	3.378		4.547	4.547	4.547				6.350	9.093
1 1/4	1.660	42.164	1.651	1.651	2.769	2.769		2.972	3.556	3.556	3.556		4.851	4.851	4.851				6.350	9.703
1 1/2	1.900	48.260	1.651	1.651	2.769	2.769		3.175	3.683	3.683	3.683		5.080	5.080	5.080				7.137	10.160
2	2.375	60.325	1.651	1.651	2.769	2.769		3.175	3.912	3.912	3.912		5.537	5.537	5.537				8.738	11.074
2 1/2	2.875	73.025	2.108	2.108	3.048	3.048		4.775	5.156	5.156	5.156		7.010	7.010	7.010				9.525	14.021
3	3.500	88.900	2.108	2.108	3.048	3.048		4.775	5.486	5.486	5.486		7.620	7.620	7.620				11.125	15.240
3 1/2	4.000	101.600	2.108	2.108	3.048	3.048		4.775	5.740	5.740	5.740		8.077	8.077	8.077					
4	4.500	114.300	2.108	2.108	3.048	3.048		4.775	6.020	6.020	6.020		8.560	8.560	8.560		11.125		13.487	17.120
5	5.563	141.300	2.769	2.769	3.404	3.404			6.553	6.553	6.553		9.525	9.525	9.525		12.700		15.875	19.050
6	6.625	168.275	2.769	2.769	3.404	3.404			7.112	7.112	7.112		10.973	10.973	10.973		14.275		18.263	21.946
8	8.625	219.075	2.769	2.769	3.759	3.759	6.350	7.036	8.179	8.179	8.179	10.312	12.700	12.700	12.700	15.088	18.263	20.625	23.012	22.225
10	10.750	273.050	3.404	3.404	4.191	4.191	6.350	7.798	9.271	9.271	9.271	12.700	12.700	15.088	12.700	18.263	21.438	25.400	28.575	25.400
12	12.750	323.850	3.962	3.962	4.572	4.572	6.350	8.382	9.525	10.312	9.525	14.275	12.700	17.475	12.700	21.438	25.400	28.575	33.325	25.400
14	14.000	355.600	3.962	3.962	4.775	6.350	7.925	9.525	9.525	11.125	9.525	15.088	12.700	19.050	12.700	23.825	27.788	31.750	35.712	
16	16.000	406.400	4.191	4.191	4.775	6.350	7.925	9.525	9.525	12.700	9.525	16.662	12.700	21.438	12.700	26.187	30.963	36.525	40.488	
18	18.000	457.200	4.191	4.191	4.775	6.350	7.925	11.125	9.525	14.275	9.525	19.050	12.700	23.825	12.700	29.362	34.925	39.675	45.237	
20	20.000	508.000	4.775	4.775	5.537	6.350	9.525	12.700	9.525	15.088	9.525	20.625	12.700	26.187	12.700	32.537	38.100	44.450	50.013	
22	22.000	558.800	4.775	4.775	5.537	6.350	9.525	12.700			9.525	22.225		28.575	12.700	34.925	41.275	47.625	53.975	
24	24.000	609.600	5.537	5.537	6.350	6.350	9.525	14.275	9.525	17.475	9.525	24.613	12.700	30.963	12.700	38.887	46.025	52.375	59.538	
26	26.000	660.400				7.925	12.700				9.525				12.700					
28	28.000	711.200				7.925	12.700	15.875			9.525				12.700					
30	30.000	762.000	6.350	6.350	7.925	7.925	12.700	15.875			9.525				12.700					
32	32.000	812.800				7.925	12.700	15.875		17.475	9.525				12.700					
34	34.000	863.600				7.925	12.700	15.875		17.475	9.525				12.700					
36	36.000	914.400				7.925	12.700	15.875		19.050	9.525				12.700					

1. The schedule numbers of 5S, 10S, 40S, and 80S comply with ASME B36.19M.
2. The others comply with ASME B36.10M.

FITOK Group

FITOK GmbH (Headquarter)
Sprendlinger Landstr. 115, 63069 Offenbach am Main, Germany
Tel.: +49 69 8900 4498 Fax: +49 69 8900 4495

FITOK, Inc.
13843 North Promenade Blvd., Suite 750, Stafford, Texas 77477, USA
Tel.: +1 281 888 0077 Fax: +1 281 582 4051

FITOK Incorporated
1-4F, Block C, Zone E, Yingtailong Industrial Park, Dalang Street,
Longhua District, Shenzhen, 518109, China
Tel.: +86 755 2803 2500 Fax: +86 755 2803 2619

FITOK Middle East Oil Equipment Trading LLC
208-209, Makateb Tower, Airport Road, P.O.Box 185412, Deira, Dubai, UAE
Tel.: +971 4 2959 853 Fax: +971 4 2959 854

info@fitokgroup.com
www.fitokgroup.com

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