

# Tubing

TMP, TCT, TBA, TEP, T15, T20, T60, TJT, TIT and TST Series



# FITOK

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# FITOK Full Technical Catalog for Tubing

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# General Information

## Types of Tubing

### Instrumentation Tubing

Available in TMP series and TCT series.

**TMP series** seamless straight-length tubing, pickled or bright annealed, external surface mechanically polished.

**TCT series** seamless coiled tubing, bright annealed, external surface mechanically polished.

Materials: stainless steel, duplex stainless steel or Nickel-based alloy. Enhanced-316/316L, with Ni, Cr and Mo contents in close approximation to upper values in ASTM standard, are available.

Sizes: TMP series: 1/16" to 2", 2 mm to 50 mm.

TCT series: 1/4" to 1/2", 6 mm to 12 mm.

Standard length: TMP series: 10 ft, 20 ft, 3 m and 6 m in straight lengths.

TCT series: up to 2130 ft or 650 m in coils.

### High Purity Tubing

Available in TBA and TEP series.

**TBA series** straight-length tubing, specially rolled and bright annealed, inner roughness of Ra 20 µin. (0.51 µm) max.; ultrasonically cleaned and dried; suitable for high-purity gas systems.

**TEP series** tubing, machined from TBA series tubing, electropolished inner surface finish of Ra 10 µin. (0.25 µm) max.; ultrasonically cleaned in clean room and purged with filtered hot Nitrogen; suitable for ultra-high purity systems.

Material: 316L stainless steel.

Sizes: 1/4" to 2 1/2", 6A to 50A.

Standard length: 20 ft, 4 m and 6 m.

### Medium and High Pressure Tubing

Available in T15, T20 and T60 series.

**T15 series** tubing, seamless in straight lengths, annealed or 1/8-hard, with working pressure up to 15,000 psig (1034 bar).

**T20 series** medium pressure tubing, seamless in straight lengths, cold-drawn and full hard, with working pressure up to 20,000 psig (1379 bar), for coned and threaded connections.

**T60 series** high pressure tubing, seamless in straight lengths, cold-drawn and full hard, with working pressure up to 60,000 psig (4137 bar), for coned and threaded connections.

Material: 316/316L stainless steel.

Sizes: T15 series: 1/8", 1/4", 3/8", 1/2", 9/16" and 3/4".

T20 series: 1/4", 3/8", 9/16", 3/4" and 1".

T60 series: 1/4", 3/8" and 9/16".

Standard length: T15 series: 20 ft and 6 m.

T20/T60 series: supplied in fractional sizes up to 20 ft and metric sizes up to 6 m.

Nipples in custom length available.

### Jacketed Tubing and Insulated Tubing

Available in TJT and TIT series.

**TJT series** jacketed tubing, seamless, corrosion and abrasion resistant, available in straight lengths or coils.

**TIT series** insulated tubing, seamless, thermal insulating, corrosion and abrasion resistant, supplied in coils.

Materials: stainless steel or copper.

Sizes: 1/4" to 1/2", 6 mm to 12 mm.

Standard length: TJT series: 20 ft and 6 m in straight lengths, or up to 2130 ft and 650 m in coils.

TIT series: up to 1100 ft or 330 m in coils.

### Heat Trace Tubing

**TST series** steam trace tubing, seamless, maintains process temperature 50°F to 200°F (10°C to 93°C) and 200°F to 355°F (93°C to 179°C), light heat trace and heavy heat trace available, supplied in coils.

Materials: stainless steel or copper

Sizes: 3/8", 1/2", 6 mm, 8 mm and 10 mm.

Standard length: up to 1050 ft or 300 m in coils.

## Materials

Material	Series	TMP	TCT	TBA	TEP	T15	T20	T60	TJT	TIT	TST
Stainless Steel	316/316L	✓	✓			✓	✓	✓	✓	✓	✓
	Enhanced-316/316L (higher Cr, Ni and Mo content)	✓	✓								
	316L			✓	✓						
	316L (JIS standard)			✓	✓						
	304/304L	✓	✓								
	6Mo (S31254)	✓									
Duplex Stainless Steel	2205	✓									
	2507	✓									
Nickel-based Alloy	400	✓									
	20	✓									
	600	✓									
	625	✓									
	825	✓									
	C-276	✓									
Copper	C10200								✓	✓	✓

Note:

- ✓ means materials are provided as standard.
- Except for the 316L in compliance with JIS standard, other materials listed comply with ASTM standard.
- Other materials are available subject to confirmation from FITOK.

## Connections

- ✓ Recommended application
- Applicable but not optimal
- Limited application subject to confirmation from FITOK
- × Not applicable

Connection	Series	TMP	TCT	TBA	TEP	T15	T20	T60	TJT	TIT	TST
6 Series Double-ferrule Tube Fittings		✓	✓	○	□	□	×	×	✓	✓	✓
6 Series Single-ferrule Tube Fittings		✓	✓	○	□	□	×	×	✓	✓	✓
37° Flared Fittings		□	○	○	×	×	×	×	○	○	○
Orbital Welding		□	○	✓	✓	×	×	×	○	○	○
15D Series Double-ferrule Tube Fittings		□	×	×	×	✓	×	×	×	×	×
15S Series Single-ferrule Tube Fittings		□	×	×	×	✓ <sup>①</sup>	×	×	×	×	×
20 Series Medium Pressure Fittings		×	×	×	×	×	✓	□	×	×	×
60 Series High Pressure Fittings		×	×	×	×	×	×	✓	×	×	×

① T15 series cold-drawn 1/8-hard tubing is not for use with 15S series single-ferrule tube fittings.

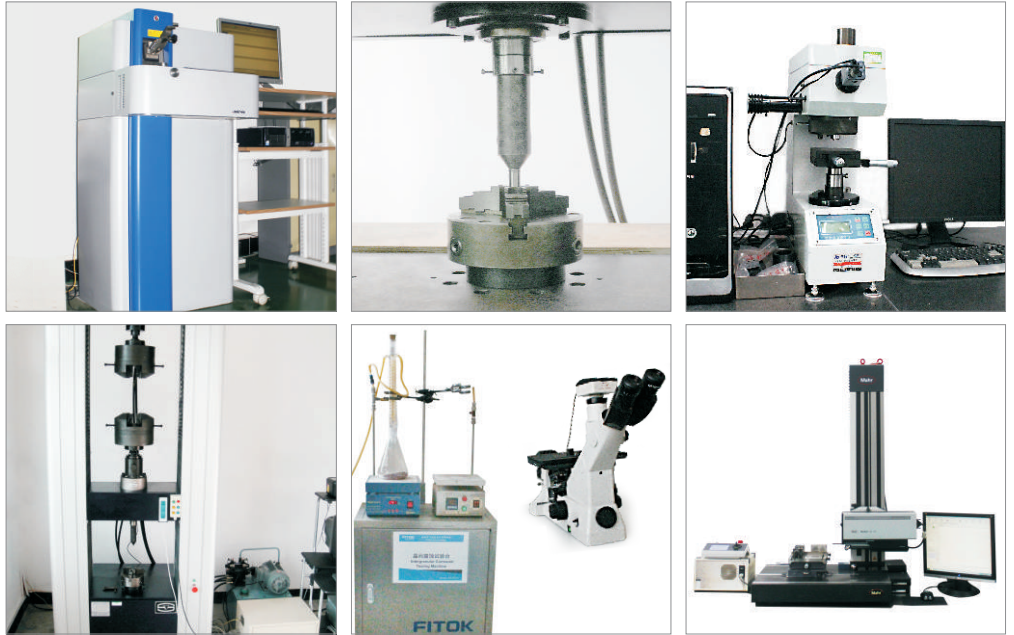
## Working Pressure

Working pressures are calculated based on ASME B31.3. To determine working pressures at elevated temperatures, multiply the working pressures at ambient temperature by the elevated temperature factors.

For more details, refer to applicable sections below.

## Inspection Items

- ⊙ Chemical analysis
- ⊙ Eddy current test
- ⊙ Pressure test
- ⊙ Hardness test
- ⊙ Tensile test
- ⊙ Flaring test
- ⊙ Corrosion test
- ⊙ Grain size
- ⊙ Surface roughness



## Packaging

### Seamless Straight-length Tubing

Tubing ends polyethylene capped; tubing bulk packed in cardboard tubes or wooden cases.

However, in between the two processes, TBA series tubing should be additionally packed in a single polyethylene bag, and TEP series tubing in double polyethylene bags.



### Seamless Coiled Tubing

Two kinds of packaging methods:

Tubing ends polyethylene capped; tubing packed in coils and wrapped with a polyethylene film.

Tubing ends polyethylene capped; tubing packed in coils on wooden reel and firmly anchored by a polyethylene plate.

The first packaging method is standard, if packaging with wooden reel is needed, please contact FITOK Group or our authorized distributors.



# Instrumentation Tubing

TMP and TCT Series

## TMP Series

### Features

- Materials: stainless steel, duplex stainless steel or Nickel-based alloy
- Sizes: 1/16" to 2" and 2 mm to 50 mm
- Working temperature: -325°F to 1000°F (-198°C to 537°C)
- Bright annealed or pickled with mechanically polished external surface
- For use with FITOK 6 series tube fittings, 4:1 safety factor for the tubing and connection part of fitting and tubing
- Marked with brand, material grade, standard, specification and heat number
- Standard length: 10 ft, 20 ft, 3 m and 6 m



### Materials

UNS	Grade	ASTM Standard	FITOK Designator	Composition %					Mechanical Properties			
				C ≤	Cr	Ni	Mo	Others	Yield Strength MPa ≥	Tensile Strength MPa ≥	Elongation % ≥	Hardness ≤
S31600/ S31603	316/316L	A269	SS	0.035 <sup>①</sup>	16-18	10-14	2.0-3.0	-	205	515	35	80 HRB
Enhanced- S31600/ S31603	Enhanced- 316/316L		SH		17-18	12-14	2.6-3.0					
S30400/ S30403	304/304L		S4		18-20	8-11	-					
S31254	6Mo	A269	S12	0.02	19.5-20.5	17.5-18.5	6.0-6.5	-	310	675	35	96 HRB
S31803	2205	A789	D5	0.03	21-23	4.5-6.5	2.5-3.5	-	450	620	25	30 HRC
S32750	2507	A789	D7	0.03	24-26	6-8	3.0-5.0	Cu,N	550	800	15	32 HRC
N04400	Alloy 400	B165	M	0.30	-	≥63	-	Cu 28-34	195	480	35	75 HRB
N08020	Alloy 20	B729	A20	0.07	19-21	32-38	2.0-3.0	Cu,Nb,Ta	240	550	30	95 HRB
N06600	Alloy 600	B167	INC	0.15	14-17	≥72	-	Cu	205	550	35	92 HRB
N06625	Alloy 625	B444	A65	0.10	20-23	≥58	8.0-10.0	Cb,Ta	414	827	30	25 HRC
N08825	Alloy 825	B163	A85	0.05	19.5-23.5	38-46	2.5-3.5	Cu,Ti	241	586	30	201 HV
N10276	Alloy C-276	B622	HC	0.01	14.5-16.5	BAL	15.0-17.0	W	283	690	40	100 HRB

① The carbon content of tubing with outside diameter smaller than 1/2" or wall thickness smaller than 0.049" is allowed up to 0.04%.



## Dimensional Tolerance

Materials	Tube O.D. (D) in. (mm)	O.D. Tolerance in. (mm)	Wall Thickness Tolerance %
316/316L Enhanced-316/316L 304/304L 6Mo	$D < 3/32$ (2.38)	+0.002 (0.05)/-0	+/-10
	$3/32$ (2.38) $\leq D < 3/16$ (4.76)	+0.003 (0.08)/-0	
	$3/16$ (4.76) $\leq D \leq 1$ (25.4)	+/-0.004 (0.10)	
	$1$ (25.4) $< D < 1\ 1/2$ (38.1)	+/-0.005 (0.13)	
	$1\ 1/2$ (38.1) $\leq D < 2$ (50.8)	+/-0.008 (0.2)	
	$D \geq 2$ (50.8)	+/-0.010 (0.25)	
2205 2505	$D < 1/2$ (12.7)	+/-0.005 (0.13)	+/-15
	$1/2$ (12.7) $\leq D \leq 3/4$ (19.05)		+/-10
Alloy 400 Alloy 20	$D < 5/8$ (16)	+/-0.005 (0.13)	+/-15
	$5/8$ (16) $\leq D < 1$ (25)		+/-10
Alloy 600	$D < 5/8$ (16)	+/-0.005 (0.13)	+/-12.5
Alloy 625	$3/16$ (4.8) $\leq D < 1/2$ (12.7)	+0.004 (0.10)/-0	+/-10
	$D \geq 1/2$ (12.7)	+0.005 (0.13)/-0	
Alloy 825	$D \leq 1/2$ (12.7)	+/-0.005 (0.13)/-0	+/-12.5
Alloy C-276		+/-0.005 (0.13)	

## Working Pressure at Ambient Temperature

Working pressures in the table below apply only to 316/316L, enhanced-316/316L and 304/304L. For working pressures of other materials, please contact FITOK Group or our authorized distributors.

### Fractional

Tube O.D. in.	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	10200							
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
2												2000	2200	2500	2900	3600

Note: For gas service, select a tube thickness outside of the shaded area when the tube is used with 6 series tube fittings.



## Metric

Tube O.D. 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	5.0
	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	490						
15		150	190	250	310	360	400	450						
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	
50										150	180	210	240	270

Note: For gas service, select a tube thickness outside of the shaded area when the tube is used with 6 series tube fittings.

## Elevated Temperature Factors

Temperature		Factor	
°F	°C	316/316L and Enhanced-316/316L	304/304L
200	93	1.00	1.00
400	204	0.96	0.93
600	315	0.85	0.82
800	426	0.79	0.76
1000	537	0.76	0.69

## TCT Series

### Features

- ⦿ Materials: 316/316L, enhanced-316/316L or 304/304L
- ⦿ Sizes: 1/4" to 1/2" and 6 mm to 12 mm
- ⦿ Working temperature: -325°F to 1000°F (-198°C to 537°C)
- ⦿ Bright annealed with mechanically polished external surface
- ⦿ For use with FITOK 6 series tube fittings, 4:1 safety factor for the tubing and connection part of fitting and tubing
- ⦿ Marked with brand, material grade, standard, specification and heat number



### Materials

UNS	Grade	ASTM Standard	FITOK Designator	Composition %				Mechanical Properties			
				C	Cr	Ni	Mo	Yield Strength MPa	Tensile Strength MPa	Elongation %	Hardness
S31600/S31603	316/316L	A269	SS	≤0.035 <sup>①</sup>	16-18	10-14	2.0-3.0	≥205	≥515	≥35	≤80 HRB
Enhanced-31600/31603	Enhanced-316/316L		SH		17-18	12-14	2.6-3.0				
S30400/S30403	304/304L		S4		18-20	8-11	-				

① The carbon content of tubing with outside diameter smaller than 1/2" or wall thickness smaller than 0.049" is allowed up to 0.04%.

### Working Pressure

Refer to the working pressure of TMP series tubing.

### Scope of Supply

#### Fractional

Tube O.D. in.	Wall Thickness in.	Standard Coil Length <sup>①</sup> ft	Max. Coil Length <sup>②</sup> ft
1/4	0.035	400	2130
	0.049		2040
	0.065		1960
3/8	0.035	400	1380
	0.049		1260
	0.065		1190
1/2	0.035 <sup>③</sup>	300	1000
	0.049		900
	0.065		850
	0.083		700

① Minimum guaranteed length.

② Custom shorter length available subject to confirmation from FITOK.

③ Not recommended for use with 6 series tube fittings in gas service.

#### Metric

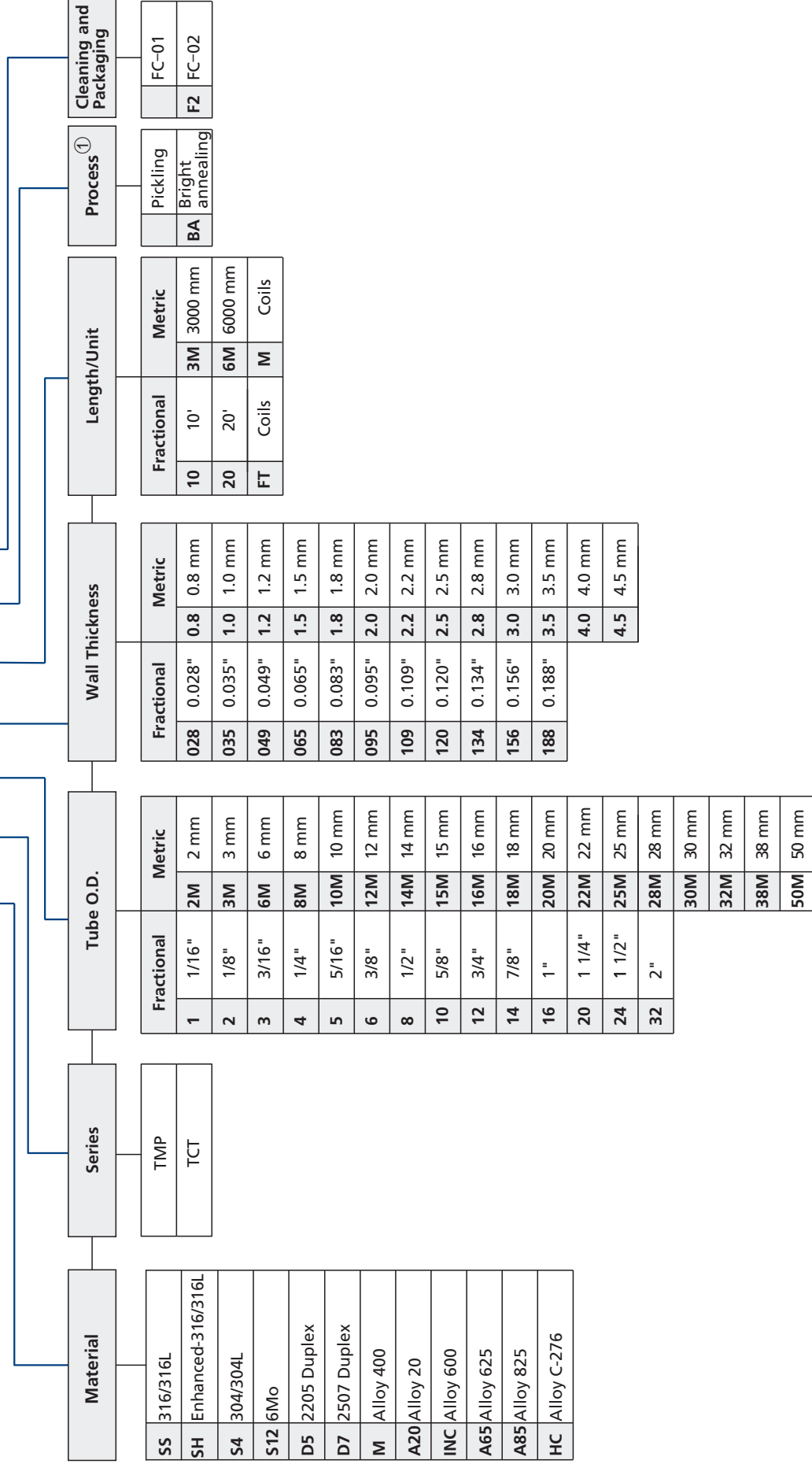
Tube O.D. mm	Wall Thickness mm	Standard Coil Length <sup>①</sup> m	Max. Coil Length <sup>②</sup> m
6	0.8	120	650
	1.0		540
	1.2		590
	1.5		600
8	1.0	120	380
	1.2		350
	1.5		400
10	1.0	120	300
	1.2		320
	1.5		300
12	1.0	100	240
	1.2		260
	1.5		250
	2.0		200

① Minimum guaranteed length.

② Custom shorter length available subject to confirmation from FITOK.

# Ordering Number Description

SS - TMP - 6 - 049 - 20 - BA - F2



Note: "Ordering Number Description" is a reference to understand the combination rules of FITOK product part number. Not all combinations are available. For any questions, please contact FITOK group or our authorized distributors.

① Applicable to 316/316L and 304/304L TMP series tubing.

# High Purity Tubing

## TBA Series and TEP Series

### Features

- ⦿ Material: 316L
- ⦿ Standard: ASTM A269 or JIS G3459
- ⦿ Sizes: 1/4" to 2 1/2" and 6A to 50A
- ⦿ Process:
  - TBA series tubing: specially rolled and bright annealed, metallic inner surface finish of Ra 20  $\mu\text{in.}$  (0.51  $\mu\text{m}$ ) max.
  - TEP series tubing: machined from TBA series tubing, electropolished inner surface finish of Ra 10  $\mu\text{in.}$  (0.25  $\mu\text{m}$ ) max.
- ⦿ Cleaning:
  - TBA series: ultrasonically cleaned and dried
  - TEP series: ultrasonically cleaned, washed, rinsed, purged with filtered hot Nitrogen and dried in clean room
- ⦿ Packaging:
  - TBA series: tubing ends are capped and tubing is packed individually in a single polyethylene bag
  - TEP series: tubing ends are capped, and tubing is packed individually in double polyethylene bags
- ⦿ Marking:
  - TBA series: tubing body is marked with brand, material grade, standard, specification, and heat number
  - TEP series: packing bags are marked with brand, material grade and specification
- ⦿ Standard length: 20 ft, 4 m and 6 m



### Materials

Grade	Standard	FITOK Designator	Composition %							
			C	Mn	P	S	Si	Ni	Cr	Mo
316L	ASTM A269	6L	$\leq 0.035$ <sup>①</sup>	$\leq 2.00$	$\leq 0.045$	$\leq 0.03$	$\leq 1.00$	10.0-15.0	16.0-18.0	2.0-3.0
	JIS G3459	6LJ	$\leq 0.03$					12.0-16.0		

① The carbon content of tubing with outside diameter smaller than 1/2" or wall thickness smaller than 0.049" is allowed up to 0.04%.

### Surface Roughness

Tube O.D. (D) mm	Outer Surface $\mu\text{in.}$ ( $\mu\text{m}$ )		Inner Surface $\mu\text{in.}$ ( $\mu\text{m}$ )	
	TBA	TEP	TBA	TEP
$6.35 \leq D \leq 48.6$	$Ra \leq 63$ (1.6)		$Ra \leq 15$ (0.38)	$Ra \leq 10$ (0.25)
$48.6 < D \leq 63.5$			$Ra \leq 20$ (0.51)	

### Purity Values

Inspection Item	TBA	TEP
Oil Content	$< 0.1 \text{ mg/ft}^2$	$< 0.01 \text{ mg/ft}^2$
Particle	$> 4 \mu\text{in.}$ (0.1 $\mu\text{m}$ ), Max.5 PCS	$> 4 \mu\text{in.}$ (0.1 $\mu\text{m}$ ), Max.1 PC
Dew Point	$-40^\circ\text{F}$ ( $-40^\circ\text{C}$ )	$-94^\circ\text{F}$ ( $-70^\circ\text{C}$ )

## Dimensional Tolerance and Scope of Supply

Tube O.D.			Wall Thickness			O.D. Tolerance	Wall Thickness Tolerance	Tubing Length	
in.	mm	A Size	in. (mm)	SCH5S	SCH10S	in. (mm)	%	m	ft
1/4	6.35		0.035 (0.89)			+/-0.004 (0.10)	+/-10	4 or 6	20
			0.039 (1.0)						
3/8	9.53		0.035 (0.89)						
			0.039 (1.0)						
1/2	12.7		0.039 (1.0)						
			0.049 (1.24)						
3/4	19.05		0.049 (1.24)						
			0.065 (1.65)						
1	25.4		0.049 (1.24)						
			0.065 (1.65)						
1 1/2	38.1		0.065 (1.65)			+/-0.008 (0.20)			
2	50.8		0.065 (1.65)			+/-0.010 (0.25)			
2 1/2	63.5		0.065 (1.65)						
	10.5	6A		1.0	1.2	+/-0.004 (0.10)			/
	13.8	8A		1.2	1.65				
	17.3	10A		1.2	1.65				
	21.7	15A		1.65	2.1				
	27.2	20A		1.65	2.1				
	34.0	25A		1.65	2.8				
	42.7	32A		1.65	2.8	+/-0.012 (0.30)			
	48.6	40A		1.65	2.8				
	60.5	50A		1.65	2.8	+/-0.020 (0.50)			

## Ordering Information

To order, add designators for materials, series, and tubing length to get a complete ordering number.

Examples:

1. Tubing, 316L stainless steel, ASTM A269 compliant, TBA series, 1/4" O.D. x 0.035" wall thickness, 20 ft length, the ordering number is 6L-TBA-4-035-20.
2. Tubing, 316L stainless steel, ASTM A269 compliant, TEP series, 1/4" O.D. x 0.035" wall thickness, 4 m length, the ordering number is 6L-TEP-4-035-4M.
3. Tubing, 316L stainless steel, JIS G3459 compliant, TEP series, 8A O.D. x 1.2 mm wall thickness, 4 m length, the ordering number is 6LJ-TEP-8A-1.2-4M.

Tube O.D. in.	Wall Thickness in.	Basic Ordering Number
1/4	0.035	□□-□□-4-035-□□
	0.039	□□-□□-4-039-□□
3/8	0.035	□□-□□-6-035-□□
	0.039	□□-□□-6-039-□□
1/2	0.039	□□-□□-8-039-□□
	0.049	□□-□□-8-049-□□
3/4	0.049	□□-□□-12-049-□□
	0.065	□□-□□-12-065-□□
1	0.049	□□-□□-16-049-□□
	0.065	□□-□□-16-065-□□
1 1/2	0.065	□□-□□-24-065-□□
2		□□-□□-32-065-□□
2 1/2		□□-□□-40-065-□□

Tube O.D.	Wall Thickness		Basic Ordering Number
	SCH5S	SCH10S	
6A	1.0		□□-□□-6A-1.0-□□
		1.2	□□-□□-6A-1.2-□□
8A	1.2		□□-□□-8A-1.2-□□
		1.65	□□-□□-8A-1.65-□□
10A	1.2		□□-□□-10A-1.2-□□
		1.65	□□-□□-10A-1.65-□□
15A	1.65		□□-□□-15A-1.65-□□
		2.1	□□-□□-15A-2.1-□□
20A	1.65		□□-□□-20A-1.65-□□
		2.1	□□-□□-20A-2.1-□□
25A	1.65		□□-□□-25A-1.65-□□
		2.8	□□-□□-25A-2.8-□□
32A	1.65		□□-□□-32A-1.65-□□
		2.8	□□-□□-32A-2.8-□□
40A	1.65		□□-□□-40A-1.65-□□
		2.8	□□-□□-40A-2.8-□□
50A	1.65		□□-□□-50A-1.65-□□
		2.8	□□-□□-50A-2.8-□□

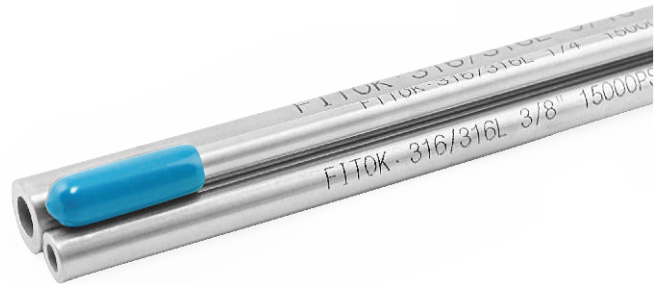
# Medium and High Pressure Tubing

T15, T20 and T60 Series

## T15 Series

### Features

- ⦿ Material: 316/316L
- ⦿ Working pressure up to 15,000 psig (1034 bar)
- ⦿ Working temperature: -325°F to 800°F (-198°C to 427°C)
- ⦿ Annealed seamless or cold-drawn 1/8-hard seamless tubing
- ⦿ For use with FITOK 15D series double-ferrule tube fittings
- ⦿ Marked with brand, material grade, specification, pressure, annealing code and heat number
- ⦿ Standard length: 20 ft and 6 m



### Materials

UNS	Grade	FITOK Designator	Composition %							
			C	Mn	P	S	Si	Cr	Ni	Mo
S31600/S31603	316/316L	SS	≤0.035	≤2.00	≤0.045	≤0.03	≤1.00	16-18	10-14	2.0-3.0

### Mechanical Properties

#### Cold-drawn 1/8-hard Seamless Tubing

UNS	Grade	Yield Strength ksi	Tensile Strength ksi	Elongation %	Hardness
S31600/S31603	316/316L	75 to 110	105 to 140	≥20	≤26 HRC

#### Annealed Seamless Tubing

UNS	Grade	Yield Strength ksi	Tensile Strength ksi	Elongation %	Hardness
S31600/S31603	316/316L	≥30	≥75	≥30	≤90 HRB

### Dimensional Tolerance

Tube O.D. in.	O.D. Tolerance in.	Wall Thickness Tolerance %
1/8	+/-0.003	+/-10
1/4	+/-0.005	
3/8		
1/2		
9/16		
3/4		



## Working Pressure at Ambient Temperature

### Cold-drawn 1/8-hard Seamless Tubing

Tube O.D. in.	Wall Thickness Tolerance in.	Working Pressure psig (bar)
1/4	0.065	15,000 (1034)
3/8	0.083	
1/2	0.109	
9/16	0.125	
3/4	0.165	

### Annealed Seamless Tubing

Tube O.D. in.	Wall Thickness Tolerance in.	Working Pressure psig (bar)
1/8	0.037	15,000 (1034)
1/4	0.083	15,000 (1034)
	0.065	10,300 (710)
3/8	0.118	15,000 (1034)
	0.095	10,000 (690)
1/2	0.156	15,000 (1034)
	0.134	11,200 (772)
9/16	0.188	15,000 (1034)
3/4	0.240	15,000 (1034)
	0.188	10,000 (690)

## Elevated Temperature Factors

Temperature		Factor
°F	°C	
100	38	1.00
200	93	
300	149	
400	204	0.96
500	260	0.89
600	316	0.85
700	371	0.81
800	427	0.79

## Ordering Information

### Cold-drawn 1/8-hard Seamless Tubing

Tube O.D. in.	Wall Thickness in.	Ordering Number <sup>①②</sup>	
1/4	0.065	SS-T15-4-065-6M	SS-T15-4-065-20
3/8	0.083	SS-T15-6-083-6M	SS-T15-6-083-20
1/2	0.109	SS-T15-8-109-6M	SS-T15-8-109-20
9/16	0.125	SS-T15-9-125-6M	SS-T15-9-125-20
3/4	0.165	SS-T15-12-165-6M	SS-T15-12-165-20

① In the ordering number, "6M" designates tubing length of 6 meters; "20" designates tubing length of 20 feet.

② Custom shorter length available upon request.

### Annealed Seamless Tubing

Tube O.D. in.	Wall Thickness in.	Ordering Number <sup>①②</sup>	
1/8	0.037	SS-T15-A-2-037-6M	SS-T15-A-2-037-20
1/4	0.083	SS-T15-A-4-083-6M	SS-T15-A-4-083-20
	0.065	SS-T15-A-4-065-6M	SS-T15-A-4-065-20
3/8	0.118	SS-T15-A-6-118-6M	SS-T15-A-6-118-20
	0.095	SS-T15-A-6-095-6M	SS-T15-A-6-095-20
1/2	0.156	SS-T15-A-8-156-6M	SS-T15-A-8-156-20
	0.134	SS-T15-A-8-134-6M	SS-T15-A-8-134-20
9/16	0.188	SS-T15-A-9-188-6M	SS-T15-A-9-188-20
3/4	0.240	SS-T15-A-12-240-6M	SS-T15-A-12-240-20
	0.188	SS-T15-A-12-188-6M	SS-T15-A-12-188-20

① In the ordering number, "6M" designates tubing length of 6 meters; "20" designates tubing length of 20 feet.

② Custom shorter length available upon request.

# T20 Series

## Features

- ⦿ Material: 316/316L
- ⦿ Working pressure up to 20,000 psig (1379 bar)
- ⦿ Working temperature: -423°F to 1200°F (-252°C to 649°C)
- ⦿ Cold-drawn seamless tubing
- ⦿ For use with FITOK 20 series medium pressure fittings
- ⦿ Marked with brand, material grade, specification, pressure, and heat number
- ⦿ Supplied in fractional sizes up to 20 ft and metric sizes up to 6 m. Nipples in custom length available



## Materials

UNS	Grade	FITOK Designator	Composition %							
			C	Mn	P	S	Si	Cr	Ni	Mo
S31600/S31603	316/316L	SS	≤0.035	≤2.00	≤0.045	≤0.03	≤1.00	16-18	10-14	2.0-3.0

## Dimensional Tolerance

Tube O.D. in.	O.D. Tolerance in.	Tube I.D. in.	I.D. Tolerance in.
1/4	-0.002/-0.007	0.109	0/-0.005
3/8		0.203	
9/16		0.312	
3/4		0.438	+/-0.005
1		0.562	

## Pressure–Temperature Ratings

Working Pressure psig (bar)				
-423 to 100°F (-252 to 37.8°C)	200°F (93°C)	400°F (204°C)	600°F (316°C)	800°F (427°C)
20,000 (1379)	20,000 (1379)	19,250 (1327)	18,050 (1244)	16,800 (1158)

If tubing is used at temperatures above 800°F (427°C) or reused thereafter, working pressures for tubing in the following table shall apply.

Working Pressure psig (bar)					
-423 to 200°F (-252 to 93°C)	400°F (204°C)	600°F (316°C)	800°F (427°C)	1000°F (538°C)	1200°F (649°C)
8,050 (555)	7,400 (510)	6,800 (469)	6,300 (434)	6,200 (427)	2,900 (200)

## Ordering Information

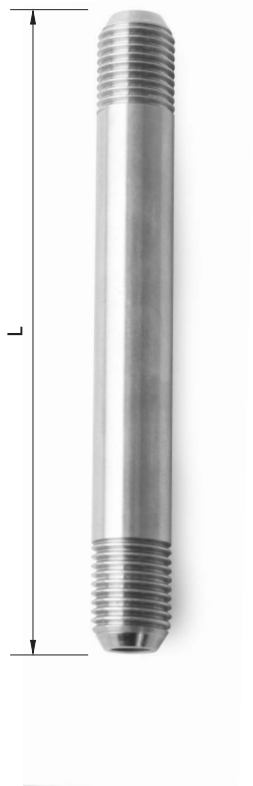
### Cold-drawn Seamless Tubing

Tube O.D. in.	Tube I.D. in.	Ordering Number <sup>①②</sup>	
1/4	0.109	SS-T20-4-6M	SS-T20-4-20
3/8	0.203	SS-T20-6-6M	SS-T20-6-20
9/16	0.312	SS-T20-9-6M	SS-T20-9-20
3/4	0.438	SS-T20-12-6M	SS-T20-12-20
1	0.562	SS-T20-16-6M	SS-T20-16-20

① In the ordering number, "6M" designates tubing length of 6 meters; "20" designates tubing length of 20 feet.

② Custom shorter length available upon request.

## Coned and Threaded Nipples



Tube O.D. in.	Tube I.D. in.	Length L <sup>①</sup> in. (mm)	Ordering Number
1/4	0.109	3.00 (76.2)	SS-T20-4CT-3
		4.00 (101.6)	SS-T20-4CT-4
		6.00 (152.4)	SS-T20-4CT-6
		8.00 (203.2)	SS-T20-4CT-8
		10.0 (254.0)	SS-T20-4CT-10
		12.0 (304.8)	SS-T20-4CT-12
3/8	0.203	3.00 (76.2)	SS-T20-6CT-3
		4.00 (101.6)	SS-T20-6CT-4
		6.00 (152.4)	SS-T20-6CT-6
		8.00 (203.2)	SS-T20-6CT-8
		10.0 (254.0)	SS-T20-6CT-10
		12.0 (304.8)	SS-T20-6CT-12
9/16	0.312	4.00 (101.6)	SS-T20-9CT-4
		6.00 (152.4)	SS-T20-9CT-6
		8.00 (203.2)	SS-T20-9CT-8
		10.0 (254.0)	SS-T20-9CT-10
		12.00 (304.8)	SS-T20-9CT-12
3/4	0.438	4.00 (101.6)	SS-T20-12CT-4
		6.00 (152.4)	SS-T20-12CT-6
		8.00 (203.2)	SS-T20-12CT-8
		10.0 (254.0)	SS-T20-12CT-10
		12.0 (304.8)	SS-T20-12CT-12
1	0.562	6.00 (152.4)	SS-T20-16CT-6
		8.00 (203.2)	SS-T20-16CT-8
		10.0 (254.0)	SS-T20-16CT-10
		12.0 (304.8)	SS-T20-16CT-12

① Nipples in custom length available upon request.

## T60 Series

### Features

- ⦿ Material: 316/316L
- ⦿ Working pressure up to 60,000 psig (4137 bar)
- ⦿ Working temperature: -423°F to 1200°F  
(-252°C to 649°C)
- ⦿ Cold-drawn seamless tubing
- ⦿ For use with FITOK 60 series high pressure fittings
- ⦿ Marked with brand, material grade, specification, pressure, and heat number
- ⦿ Supplied in fractional sizes up to 20 ft and metric sizes up to 6 m. Nipples in custom length available



### Materials

UNS	Grade	FITOK Designator	Composition %							
			C	Mn	P	S	Si	Cr	Ni	Mo
S31600/S31603	316/316L	SS	≤0.035	≤2.00	≤0.045	≤0.03	≤1.00	16-18	10-14	2.0-3.0

### Dimensional Tolerance

Tube O.D. in.	O.D. Tolerance in.	Tube I.D. in.	I.D. Tolerance in.
1/4	-0.002/-0.007	0.083	0/-0.005
3/8	-0.005/-0.01	0.125	
9/16		0.188	

### Pressure-Temperature Ratings

Working Pressure psig (bar)				
-423 to 100°F (-252 to 37.8°C)	200°F (93°C)	400°F (204°C)	600°F (316°C)	800°F (427°C)
60,000 (4137)	60,000 (4137)	57,750 (3982)	54,250 (3740)	50,700 (3496)

If tubing is used at temperatures above 800°F (427°C) or reused thereafter, working pressures for tubing in the following table shall apply.

Working Pressure psig (bar)					
-423 to 200°F (-252 to 93°C)	400°F (204°C)	600°F (316°C)	800°F (427°C)	1000°F (538°C)	1200°F (649°C)
24,200 (1669)	22,200 (1531)	20,500 (1413)	18,850 (1300)	18,600 (1282)	8,750 (603)

## Ordering Information

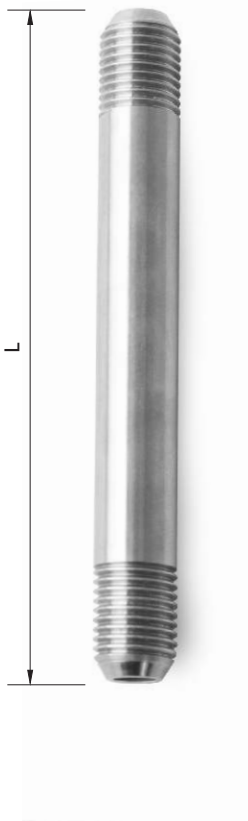
### Cold-drawn Seamless Tubing

Tube O.D. in.	Tube I.D. in.	Ordering Number <sup>①②</sup>	
1/4	0.083	SS-T60-4-6M	SS-T60-4-20
3/8	0.125	SS-T60-6-6M	SS-T60-6-20
9/16	0.188	SS-T60-9-6M	SS-T60-9-20

① In the ordering number, "6M" designates tubing length of 6 meters; "20" designates tubing length of 20 feet.

② Custom shorter length available upon request.

### Coned and Threaded Nipples



Tube O.D. in.	Tube I.D. in.	Length L <sup>①</sup> in. (mm)	Ordering Number
1/4	0.083	2.75 (69.9)	SS-T60-4CT-2.75
		3.00 (76.2)	SS-T60-4CT-3
		4.00 (101.6)	SS-T60-4CT-4
		6.00 (152.4)	SS-T60-4CT-6
		8.00 (203.2)	SS-T60-4CT-8
		10.0 (254.0)	SS-T60-4CT-10
		12.0 (304.8)	SS-T60-4CT-12
3/8	0.125	3.00 (76.2)	SS-T60-6CT-3
		4.00 (101.6)	SS-T60-6CT-4
		6.00 (152.4)	SS-T60-6CT-6
		8.00 (203.2)	SS-T60-6CT-8
		10.0 (254.0)	SS-T60-6CT-10
		12.0 (304.8)	SS-T60-6CT-12
9/16	0.188	4.00 (101.6)	SS-T60-9CT-4
		6.00 (152.4)	SS-T60-9CT-6
		8.00 (203.2)	SS-T60-9CT-8
		10.0 (254.0)	SS-T60-9CT-10
		12.0 (304.8)	SS-T60-9CT-12

① Nipples in custom length available upon request.



# Jacketed Tubing and Insulated Tubing

## TJT Series and TIT Series

### Features

- ⦿ Materials:
  - TJT series: stainless steel or copper tubing, PVC jacket
  - TIT series: stainless steel or copper tubing, fibrous glass insulation, PVC jacket
- ⦿ Sizes: 1/4" to 1/2", 6 mm to 12 mm
- ⦿ Working temperature:
  - TJT series: -31°F to 194°F (-35°C to 90°C)
  - TIT series: -20°F to 400°F (-29°C to 204°C)
- ⦿ Stainless steel tubing bright annealed with mechanically polished external surface
- ⦿ For use with FITOK 6 series tube fittings, 4:1 safety factor for the tubing and connection part of fitting and tubing
- ⦿ Outer jacket marked with brand, tubing material grade, standard, specification, heat number, and jacket material



### Materials

#### Tubing

UNS	Grade	ASTM Standard	FITOK Designator	Composition %					Mechanical Properties			
				C	Cr	Ni	Mo	Cu	Yield Strength MPa	Tensile Strength MPa	Elongation %	Hardness
S31600/ S31603	316/ 316L	A269	SS	≤0.035 <sup>①</sup>	16-18	10-14	2.0-3.0	-	≥205	≥515	≥35	≤80 HRB
C10200	-	B75	CU	-	-	-	-	99.95	≥62	≥205	-	-

① The carbon content of tubing with outside diameter smaller than 1/2" or wall thickness smaller than 0.049" is allowed up to 0.04%.

#### PVC Jacket

Min. Tensile Strength	1530 psig (105 bar)
Min. Elongation	300%
Shore Hardness	80 HA
Max. Working Temperature	194°F (90°C)
Min. Installation Temperature	-31°F (-35°C)
Min. Working Temperature	-31°F (-35°C)
Resistance to Chloride	Yes
Max. Water Absorption	0.06%

## Technical Data

### TJT Series

#### Fractional

Material Code	UNS	Tube O.D. in.	Wall Thickness in.	Max. Working Temperature °F (°C)	Min. Working Temperature °F (°C)	Working Pressure psig	Min. Bend Radius in.	Jacket O.D. mm	Coiled Tubing		Straight-length Tubing ft				
									Standard <sup>①</sup> Coil Length ft	Max. <sup>②</sup> Coil Length ft					
SS	S31600/ S31603	1/4	0.035	194 (90)	-31 (-35)	5100	8.00	0.32	400	2130	20				
		3/8	0.035			3300		0.45		1380					
		1/2	0.035 <sup>③</sup>			2600		0.57	300	1000					
			0.049			3700				900					
CU	C10200	1/4	0.035			194 (90)		-31 (-35)	1600	8.00		0.32	600	2130	20
		3/8	0.035						1000			0.45		1240	
		1/2	0.035 <sup>③</sup>						800			0.57		1082	
			0.049						1100					984	

#### Metric

Material Code	UNS	Tube O.D. mm	Wall Thickness mm	Max. Working Temperature °C (°F)	Min. Working Temperature °C (°F)	Working Pressure bar	Min. Bend Radius cm	Jacket O.D. mm	Coiled Tubing		Straight-length Tubing m				
									Standard <sup>①</sup> Coil Length m	Max. <sup>②</sup> Coil Length m					
SS	S31600/ S31603	6	1.0	90 (194)	-35 (-31)	420	20.3	7.9	120	650	6				
		10	1.0			240		11.7		300					
		12	1.0			200		13.7		240					
CU	C10200	6	1.0			90 (194)		-35 (-31)	140	20.3		7.9	200	650	6
		10	1.0						80			11.7		380	
		12	1.0 <sup>③</sup>						60			13.7		300	

① Minimum guaranteed length.

② Custom shorter length available subject to confirmation from FITOK.

③ Not recommended for use with 6 series tube fittings in gas service.

**TIT Series**  
**Fractional**

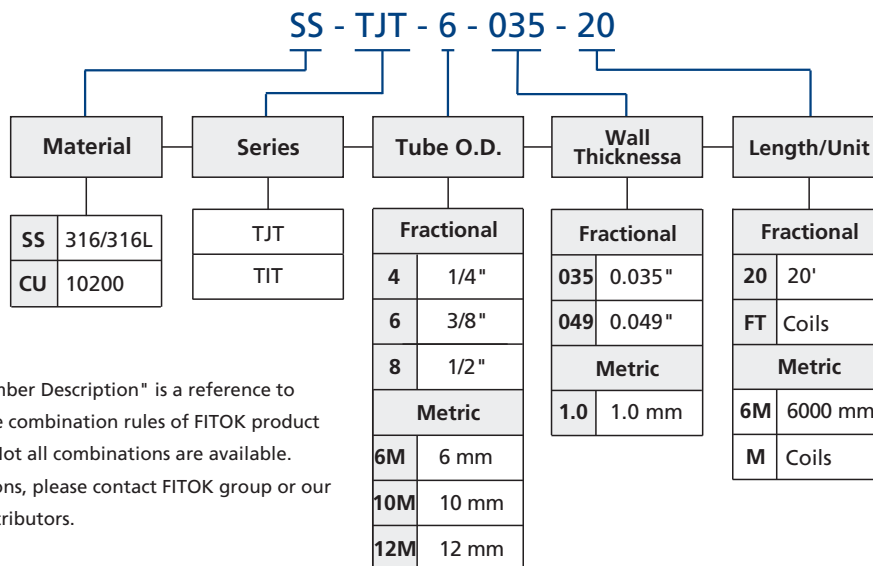
Material Code	UNS	Tube O.D. in.	Wall Thickness in.	Max. Working Temperature °F (°C)	Min. Working Temperature °F (°C)	Working Pressure psig	Min. Bend Radius in.	Nominal Product O.D. in.	Standard <sup>①</sup> Coil Length ft	Max. <sup>②</sup> Coil Length ft
SS	S31600/ S31603	1/4	0.035	400 (204)	-20 (-29)	4900	8.00	1.00	400	1100
		3/8	0.035			3200		1.13		1050
		1/2	0.035 <sup>③</sup>			2500		1.25	300	1000
			0.049			3500				900
CU	C10200	1/4	0.035	400 (204)	-20 (-29)	800	8.00	1.00	600	1000
		3/8	0.035			500		1.13		980
		1/2	0.035 <sup>③</sup>			400		1.25		
			0.049			550				

**Metric**

Material Code	UNS	Tube O.D. mm	Wall Thickness mm	Max. Working Temperature °C (°F)	Min. Working Temperature °C (°F)	Working Pressure bar	Min. Bend Radius cm	Nominal Product O.D. mm	Standard <sup>①</sup> Coil Length m	Max. <sup>②</sup> Coil Length m
SS	S31600/ S31603	6	1.0	204 (400)	-29 (-20)	403	20.3	24.9	120	330
		10	1.0			230		28.7		300
		12	1.0			192		30.7	100	240
CU	C10200	6	1.0	204 (400)	-29 (-20)	70	20.3	24.9	200	330
		10	1.0			40		28.7		300
		12	1.0 <sup>③</sup>			30		30.7		300

- ① Minimum guaranteed length.
- ② Custom shorter length available subject to confirmation from FITOK.
- ③ Not recommended for use with 6 series tube fittings in gas service.

**Ordering Number Description**



Note: "Ordering Number Description" is a reference to understand the combination rules of FITOK product part number. Not all combinations are available. For any questions, please contact FITOK group or our authorized distributors.

# Heat Trace Tubing

## TST Series

### Features

- ⦿ Steam trace
- ⦿ Materials: stainless steel or copper process tube and tracer tube, fibrous glass insulation, PVC jacket
- ⦿ Sizes:  
Process tube: 3/8", 1/2" and 10 mm  
Tracer tube: 1/2", 6 mm and 8 mm
- ⦿ Maintains process temperatures from 50°F to 355°F (10°C to 179°C)
- ⦿ For use with FITOK 6 series tube fittings, 4:1 safety factor for tubing and connection part of fitting and tubing
- ⦿ Jacket marked with brand, heat trace type, ordering number and heat number



### Materials of Process Tube and Tracer Tube

UNS	Grade	ASTM Standard	FITOK Designator	Composition %					Mechanical Properties			
				C	Cr	Ni	Mo	Cu	Yield Strength MPa	Tensile Strength MPa	Elongation %	Hardness
S31600/ S31603	316/ 316L	A269	SS	≤0.035 <sup>①</sup>	16-18	10-14	2.0-3.0	-	≥205	≥515	≥35	≤80HRB
C10200	-	B75	CU	-	-	-	-	99.95	≥62	≥205	-	-

① The carbon content of tubing with outside diameter smaller than 1/2" or wall thickness smaller than 0.049" is allowed up to 0.04%.

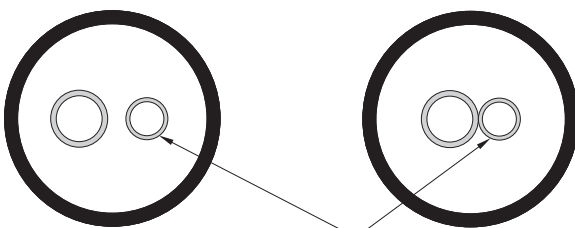
### PVC Jacket

Min. Tensile Strength	1530 psig (105 bar)
Min. Elongation	300%
Shore Hardness	80 HA
Max. Working Temperature	194°F (90°C)
Min. Installation Temperature	-31°F (-35°C)
Min. Working Temperature	-31°F (-35°C)
Resistance to Chloride	Yes
Max. Water Absorption	0.06%

### Types

#### Light Heat Trace

#### Heavy Heat Trace



#### Temperature Maintenance Range

Light Heat Trace	Heavy Heat Trace
50°F to 200°F (10°C to 93°C)	200°F to 355°F (93°C to 179°C)

## Technical Data

### Fractional

Process Tube Tube O.D. x Wall Thickness, in.	Tracer Tube Tube O.D. x Wall Thickness, in.	Nominal Product O.D. in.	Min. Bend Radius in.	Standard Coil Length <sup>①</sup> ft	Max. Coil Length <sup>②</sup> ft
316/316L Process Tube and Tracer Tube					
3/8 × 0.035	3/8 × 0.035	1 1/2	8.00	400	1050
1/2 × 0.035 <sup>③</sup>	3/8 × 0.035			300	1000
1/2 × 0.049	1/2 × 0.049				900
C10200 Process Tube and 316/316L Tracer Tube					
3/8 × 0.035	3/8 × 0.035	1 1/2	8.00	600	980
1/2 × 0.035 <sup>③</sup>	3/8 × 0.035				
1/2 × 0.049	1/2 × 0.049				

① Minimum guaranteed length.

② Custom shorter length available subject to confirmation from FITOK.

③ Not recommended for use with 6 series tube fittings in gas service.

### Metric

Process Tube Tube O.D. x Wall Thickness, mm	Tracer Tube Tube O.D. x Wall Thickness, mm	Nominal Product O.D. mm	Min. Bend Radius cm	Standard Coil Length <sup>①</sup> m	Max. Coil Length <sup>②</sup> m
316/316L Process Tube and Tracer Tube					
10 × 1	6 × 1	38	20.3	100	300
10 × 1	8 × 1				
C10200 Process Tube and 316/316L Tracer Tube					
10 × 1	6 × 1	38	20.3	120	300
10 × 1	8 × 1				

① Minimum guaranteed length.

② Custom shorter length available subject to confirmation from FITOK.

## Working Pressure

Refer to the working pressure of TMP series tubing.

## Ordering Information

### Fractional

Please add the length unit "M" or "FT" after the basic ordering number to get a complete ordering number.

Process Tube			
Process Tube	Tracer Tube	Basic Ordering Number	
Tube O.D. x Wall Thickness in.	Tube O.D. x Wall Thickness in.	Light Heat Trace	Heavy Heat Trace
316/316L Process Tube and Tracer Tube			
3/8 × 0.035	3/8 × 0.035	SS-TST-L-6035-SS6035-□	SS-TST-H-6035-SS6035-□
1/2 × 0.035	3/8 × 0.035	SS-TST-L-8035-SS6035-□	SS-TST-H-8035-SS6035-□
1/2 × 0.049	1/2 × 0.049	SS-TST-L-8049-SS6035-□	SS-TST-H-8049-SS6035-□
C10200 Process Tube and 316/316L Tracer Tube			
3/8 × 0.035	3/8 × 0.035	CU-TST-L-6035-SS6035-□	CU-TST-H-6035-SS6035-□
1/2 × 0.035	3/8 × 0.035	CU-TST-L-8035-SS6035-□	CU-TST-H-8035-SS6035-□
1/2 × 0.049	1/2 × 0.049	CU-TST-L-8049-SS8049-□	CU-TST-H-8049-SS8049-□

### Metric

Process Tube			
Process Tube	Tracer Tube	Ordering Number	
Tube O.D. x Wall Thickness mm	Tube O.D. x Wall Thickness mm	Light Heat Trace	Heavy Heat Trace
316/316L Process Tube and Tracer Tube			
10 × 1	6 × 1	SS-TST-L-10M1.0-SS6M1.0-M	SS-TST-H-10M1.0-SS6M1.0-M
10 × 1	8 × 1	SS-TST-L-10M1.0-SS8M1.0-M	SS-TST-H-10M1.0-SS8M1.0-M
C10200 Process Tube and 316/316L Tracer Tube			
10 × 1	6 × 1	CU-TST-L-10M1.0-SS6M1.0-M	CU-TST-H-10M1.0-SS6M1.0-M
10 × 1	8 × 1	CU-TST-L-10M1.0-SS8M1.0-M	CU-TST-H-10M1.0-SS8M1.0-M

# Related Products

## Bottle Configuration Sampling Systems

### © BLD2 - Continuous Needle Purge Type

Sampling from medium or high pressure devices or process lines



## Cylinder Configuration Sampling Systems

### © CSF4 - Outlet to Flare Type with Expansion Chamber

For liquefied gas sampling



## Hand Tube Benders

### © HTB Series



## Tube Cutters

### © FTC Series



## Tube Deburring Tools

### © TDT Series



## Coning Tools



## Threading Tools





## 6 Series Tube Fittings



## 15D Series Tube Fittings

© 10,000 - 15,000 psig



## 20 Series Medium Pressure Fittings

© 20,000 psig



## 60 Series High Pressure Fittings

© 60,000 psig



## General Instrumentation Needle Valves

© **NF Series**  
Forged-body needle valves



## General Instrumentation Ball Valves

© **BO Series**  
One-piece instrumentation ball valves, no dead zone



## Medium & High Pressure Needle Valves

© **20N Series**



## Medium & High Pressure Ball Valves

© **15B Series**



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