

FluoroLine[®] Ultrapure PFA Tubing

Excels in ultrapure, chemically corrosive applications

Entegris offers a complete line of tubing to satisfy your need for an ultraclean, leak-free fluid delivery network. Made from high-purity PFA material, our tubing withstands your harshest, chemically corrosive applications. Sizes range from 1/16" – 1 1/2" and 40 mm, and many material options provide flexibility to meet any fluid system design. For extreme purity needs, we offer an ultraclean (UC) tube product that has the lowest total metal extractables and least amount of surface contamination.

APPLICATIONS

- High-purity, corrosive chemical handling
- Excellent performance with low surface tension chemistries
- Semiconductor applications including photolithography, CMP, bulk chemical delivery, and wet etch and clean processes



FEATURES & BENEFITS

Made from high purity 100% PFA material	Resistant to highly corrosive, high-purity chemical environments
Manufactured in an ISO certified, Class 7 clean environment	Controls manufacturing process and maintains tubing cleanliness
Meets SEMI[®] F57-0314 specifications	Assures tubing cleanliness, maintaining process integrity in liquid chemical distribution systems <i>Note: UMT 3M 6502UHP tubing is still undergoing qualification.</i>
Excellent optical clarity	Allows visual inspection of chemical flowing in the system
Optional ultraclean (UC) tubing available	Provides the lowest metal extractable levels and the least amount of surface contamination, maintaining process purity

DIMENSIONS AND TOLERANCES

Size	Tube size OD	Wall thickness	Tube size ID	Minimum bend radius	Maximum roll length	Maximum reel length	Material options
1/16"	1.57 mm (0.062") ±0.08 mm (±0.003")	0.38 mm (0.015") ±0.08 mm (±0.003")	0.81 mm (0.032")	10 mm (0.4")	100 ft	NA	Chemours 440
1/8"	3.18 mm (0.125") ±0.08 mm (±0.003")	0.76 mm (0.030") ±0.10 mm (±0.004")	1.65 mm (0.065")	13 mm (0.5")	500 ft	2500 ft	Chemours 440, 450
3/16"	4.76 mm (0.188") ±0.08 mm (±0.003")	0.76 mm (0.030") ±0.10 mm (±0.004")	3.23 mm (0.127")	25 mm (1.0")	500 ft	3000 ft	Chemours 440, 450
6 mm	6 mm ±0.10 mm	1.20 mm ±0.10 mm	3.6 mm	40 mm	500 ft	5000 ft	Chemours 440
1/4"	6.35 mm (0.250") ±0.10 mm (±0.004")	0.76 mm (0.030") ±0.10 mm (±0.004")	4.83 mm (0.190")	51 mm (2.0")	500 ft	2500 ft	Chemours 440, 450
1/4"	6.35 mm (0.250") ±0.10 mm (±0.004")	1.19 mm (0.047") ¹ ±0.10 mm (±0.004")	3.96 mm (0.156")	38 mm (1.5")	500 ft	2500 ft	Chemours 440, 450, 950, Daikin AP231SH, 3M 6502UHP
1/4"	6.35 mm (0.250") ±0.10 mm (±0.004")	1.57 mm (0.062") ±0.13 mm (±0.005")	3.20 mm (0.126")	38 mm (1.5")	500 ft	2500 ft	Chemours 440, 450
8 mm	8 mm ±0.10 mm	1.20 mm ±0.10 mm	5.6 mm	40 mm	500 ft	2000 ft	Chemours 440
5/16"	7.92 mm (0.312") ±0.10 mm (±0.004")	0.76 mm (0.030") ±0.10 mm (±0.004")	6.40 mm (0.252")	56 mm (2.2")	500 ft	2000 ft	Chemours 440, 450
3/8"	9.52 mm (0.375") ±0.10 mm (±0.004")	0.76 mm (0.030") ±0.10 mm (±0.004")	8.00 mm (0.315")	89 mm (3.5")	500 ft	5000 ft	Chemours 440, 450
3/8"	9.52 mm (0.375") ±0.10 mm (±0.004")	1.57 mm (0.062") ¹ ±0.13 mm (±0.005")	6.38 mm (0.251")	51 mm (2.0")	500 ft	5000 ft	Chemours 440, 450, 950, Daikin AP231SH, 3M 6502UHP
10 mm	10 mm ±0.10 mm	1.60 mm ±0.10 mm	6.8 mm	50 mm	500 ft	3500 ft	Chemours 440
12 mm	12 mm ±0.10 mm	1.60 mm ±0.10 mm	8.8 mm	70 mm	500 ft	4000 ft	Chemours 440
1/2"	12.70 mm (0.500") ±0.13 mm (±0.005")	0.76 mm (0.030") ±0.10 mm (±0.004")	11.18 mm (0.440")	127 mm (5.0")	500 ft	2000 ft	Chemours 440, 450
1/2"	12.70 mm (0.500") ±0.13 mm (±0.005")	1.57 mm (0.062") ¹ ±0.13 mm (±0.005")	9.55 mm (0.376")	58 mm (2.3")	500 ft	4000 ft	Chemours 440, 450, 950, Daikin AP231SH, 3M 6502UHP
3/4"	19.05 mm (0.750") ±0.13 mm (±0.005")	1.57 mm (0.062") ¹ ±0.13 mm (±0.005")	15.90 mm (0.626")	229 mm (9.0")	250 ft	1500 ft	Chemours 440, 450, 950, Daikin AP231SH, 3M 6502UHP
1"	25.40 mm (1.000") ±0.13 mm (±0.005")	1.57 mm (0.062") ¹ ±0.13 mm (±0.005")	22.25 mm (0.876")	279 mm (11.0")	250 ft	750 ft	Chemours 440, 450, 950, Daikin AP231SH, 3M 6502UHP
1 1/4"	31.75 mm (1.250") ±0.18 mm (±0.007")	1.90 mm (0.075") ±0.18 mm (±0.007")	27.94 mm (1.100")	318 mm (12.5")	NA ²	500 ft	Chemours 440, 450, 3M 6502UHP
1 1/2"	38.10 mm (1.500") ±0.18 mm (±0.007")	2.18 mm (0.086") ±0.18 mm (±0.007")	33.73 mm (1.328")	572 mm (22.5")	NA ²	500 ft	Daikin AP231SH
40 mm	40 mm ±0.18 mm (±0.007")	2.18 mm (0.086") ±0.18 mm (±0.007")	35.51 mm (1.398")	572 mm (22.5")	NA ²	500 ft	Chemours 450, Daikin AP231SH, 3M 6502UHP

¹Standard for PrimeLock® and Flaretek® fittings

²Sold in full reels only

PERFORMANCE DATA

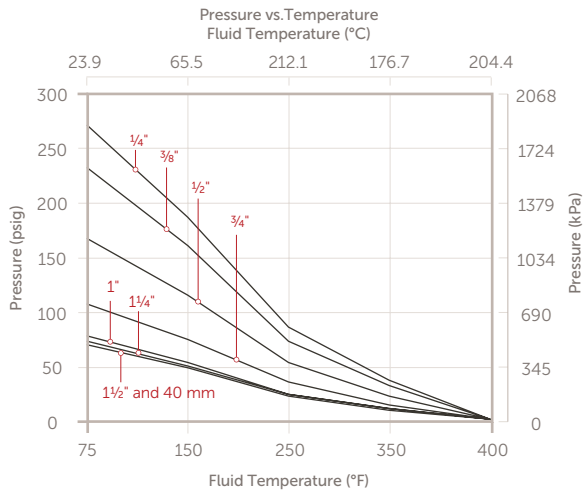
Pressure/Temperature Ratings

We used ASTM D2837 to establish FluoroLine® PFA tubing pressure ratings. This test exposed the tubing to long-term, constant pressures at various temperature settings. Our test took 22 months to complete. From the analysis, we multiplied a hydrostatic design bases (HDB) value by a safety design factor to obtain a hydrostatic design stress. We used the HDB value to

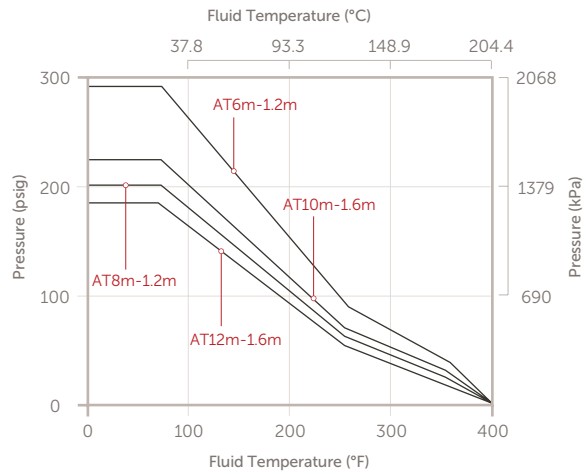
determine the tubing operating parameters. FluoroLine Line PFA tubing completed this extensive testing.

All FluoroLine tubing is fully characterized and all performance ratings were derived from quantifiable data. Our design and process expertise allows you to confidently design your fluid systems reliably and safely.

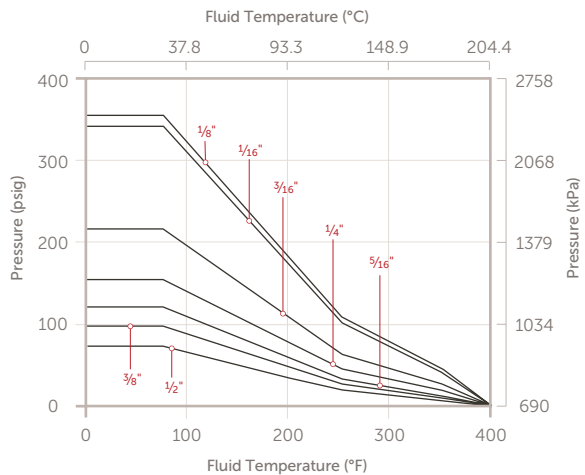
Ratings for Standard Wall FluoroLine Tubing



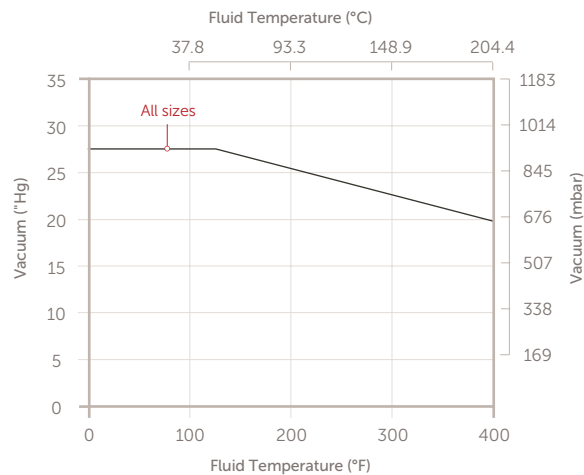
Ratings for Standard Wall FluoroLine Tubing Metric Size



Ratings for Thin Wall FluoroLine PFA Tubing



Vacuum Limitations on Thin (0.030\") Wall FluoroLine PFA Tubing

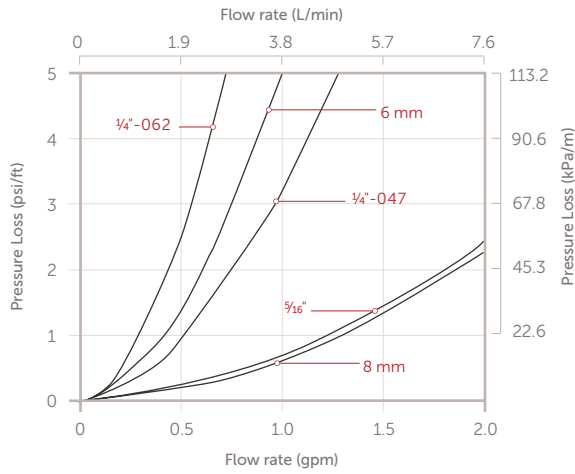


PRESSURE LOSS VS. FLOW

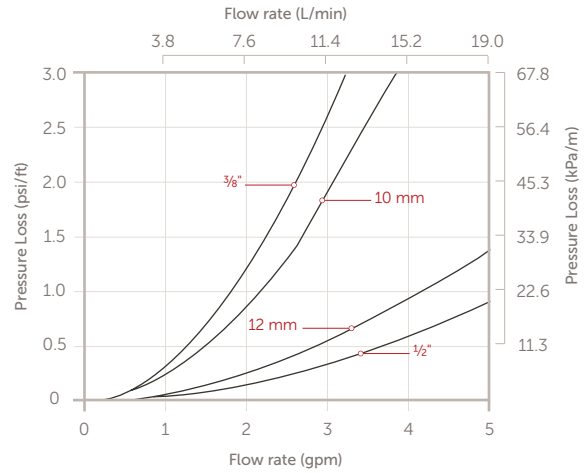
This data is for water (fluid with specific gravity = 1.0).

For pressure loss vs. flow capability outside of these calculations, please contact Entegris.

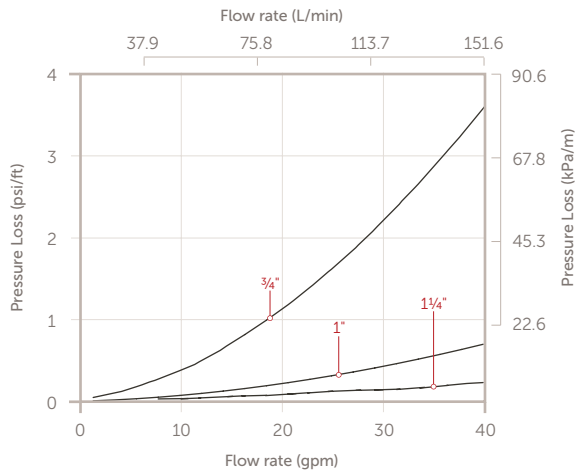
Standard Wall Tubing – 1/4", 6 mm, 5/16", 8 mm



Standard Wall Tubing – 3/8", 10 mm, 12 mm, 1/2"



Standard Wall Tubing – 3/4", 1", 1 1/4"



MAXIMUM PRESSURE RATINGS

Maximum pressure capabilities of various sizes are listed below. Use these ratings as a guide when designing your system.

Size	Temperature	FluoroLine Ultrapure PFA tubing	Size	Temperature	FluoroLine Ultrapure PFA tubing
1/4"	24°C (75°F)	1882 kPa (273 psig)	3/4"	24°C (75°F)	738 kPa (107 psig)
	93°C (200°F)	938 kPa (136 psig)		93°C (200°F)	365 kPa (53 psig)
	121°C (250°F)	586 kPa (85 psig)		121°C (250°F)	228 kPa (33 psig)
	150°C (300°F)	421 kPa (61 psig)		150°C (300°F)	165 kPa (24 psig)
	175°C (350°F)	248 kPa (36 psig)		175°C (350°F)	95.5 kPa (14 psig)
	200°C (400°F)	N/R		200°C (400°F)	N/R
3/8"	24°C (75°F)	1613 kPa (234 psig)	1"	24°C (75°F)	531 kPa (77 psig)
	93°C (200°F)	800 kPa (116 psig)		93°C (200°F)	262 kPa (38 psig)
	121°C (250°F)	503 kPa (73 psig)		121°C (250°F)	1695 kPa (24 psig)
	150°C (300°F)	359 kPa (52 psig)		150°C (300°F)	117 kPa (17 psig)
	175°C (350°F)	214 kPa (32 psig)		175°C (350°F)	68.9 kPa (10 psig)
	200°C (400°F)	N/R		200°C (400°F)	N/R
1/2"	24°C (75°F)	1158 kPa (168 psig)	1 1/4"	24°C (75°F)	552 kPa (80 psig)
	93°C (200°F)	572 kPa (83 psig)	1 1/2" and 40 mm	24°C (75°F)	476 kPa (69 psig)
	121°C (250°F)	359 kPa (52 psig)			
	150°C (300°F)	255 kPa (37 psig)			
	175°C (350°F)	152 kPa (22 psig)			
	200°C (400°F)	N/R			

N/R = not rated, contact Entegris

ORDERING INFORMATION

Not all combinations are available. Please visit our Website for all valid combinations (products/fluid management/tubing and pipe).

FluoroLine Ultrapure PFA Tubing: part number

.....	Tube material AT = Chemours 440 UAT = Chemours 450 UMT = 3M 6502UHP XAT = Chemours 950 XKT = Daikin AP231SH	Outside tube diameter*	015 = 1/16"	1000 = 1"	Package*** X = 10' straight (blank) = Roll/Reel	Options (blank) = Standard UC = Ultraclean**
			125 = 1/8"	1250 = 1 1/4"		
			187 = 3/16"	1500 = 1 1/2"		
			250 = 1/4"	6M = 6 mm		
			312 = 5/16"	8M = 8 mm		
375 = 3/8"	10M = 10 mm	Wall thickness	047 = 1.19 mm (0.047")			
500 = 1/2"	12M = 12 mm	1.2M = 1.20 mm (0.47")	062 = 1.57 mm (0.062")			
750 = 3/4"	1570 = 40 mm	1.6M = 1.60 mm (0.063")	075 = 1.90 mm (0.075")			
			086 = 2.18 mm (0.086")			
			015 = 0.38 mm (0.015")			
			030 = 0.76 mm (0.030")			

* XKT and UMT tube materials are only available in 1/4", 3/8", 1/2", 3/4", 1", 1 1/4", and 40 mm outside tube diameters.

** Ultraclean (UC) option is only available with Chemours 450 (UAT), Daikin AP231SH (XKT), and 3M 6502UHP (UMT) tube materials.

*** Quantities between roll and reel length maximums will be packaged on a reel.

FOR MORE INFORMATION

Please call your Regional Customer Service Center today to learn what Entegris can do for you. Visit entegris.com and select the [Contact Us](#) link to find the customer service center nearest you.

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