

FluoroLine® Ultrapure PFA Tubing

High-purity, 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 1/8" to 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.



Enables an ultraclean, leak-free fluid delivery network.

APPLICATIONS

- High-purity, corrosive chemical handling
- Semiconductor applications including photolithography, bulk chemical delivery, CMP, WEC
- Chemical delivery in life sciences applications
- Solar, LED, flat panel display
- Excellent performance with low surface tension chemistries

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 |
| 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 |

SPECIFICATIONS

| Size | Tube size OD | Wall thickness | Material options |
|--------|--|--|--|
| 1/8" | 0.125" \pm 0.003" (3.18 mm \pm 0.08 mm) | 0.030" \pm 0.004" (0.76 mm \pm 0.10 mm) | Chemours 440, 450 |
| 3/16" | 0.188" \pm 0.003" (4.76 mm \pm 0.08 mm) | 0.030" \pm 0.004" (0.76 mm \pm 0.10 mm) | Chemours 440, 450 |
| 6 mm | 6 mm \pm 0.10 mm | 1.20 mm \pm 0.10 mm | Chemours 440 |
| 1/4" | 0.250" \pm 0.004" (6.35 mm \pm 0.10 mm) | 0.030" \pm 0.004" (0.76 mm \pm 0.10 mm) | Chemours 440, 450 |
| 1/4" | 0.250" \pm 0.004" (6.35 mm \pm 0.10 mm) | 0.047" \pm 0.004" (1.19 mm \pm 0.10 mm) ¹ | Chemours 440, 450, 950, Daikin AP231SH |
| 1/4" | 0.250" \pm 0.004" (6.35 mm \pm 0.10 mm) | 0.062" \pm 0.005" (1.57 mm \pm 0.13 mm) | Chemours 440, 450 |
| 8 mm | 8 mm \pm 0.10 mm | 1.20 mm \pm 0.10 mm | Chemours 440 |
| 5/16" | 0.312" \pm 0.004" (7.92 mm \pm 0.10 mm) | 0.030" \pm 0.004" (0.76 mm \pm 0.10 mm) | Chemours 440, 450 |
| 3/8" | 0.375" \pm 0.004" (9.52 mm \pm 0.10 mm) | 0.030" \pm 0.004" (0.76 mm \pm 0.10 mm) | Chemours 440, 450 |
| 3/8" | 0.375" \pm 0.004" (9.52 mm \pm 0.10 mm) | 0.062" \pm 0.005" (1.57 mm \pm 0.13 mm) ¹ | Chemours 440, 450, 950, Daikin AP231SH |
| 10 mm | 10 mm \pm 0.10 mm | 1.60 mm \pm 0.13 mm | Chemours 440 |
| 12 mm | 12 mm \pm 0.10 mm | 1.60 mm \pm 0.13 mm | Chemours 440 |
| 1/2" | 0.500" \pm 0.005" (12.70 mm \pm 0.13 mm) | 0.030" \pm 0.004" (0.76 mm \pm 0.10 mm) | Chemours 440, 450 |
| 1/2" | 0.500" \pm 0.005" (12.70 mm \pm 0.13 mm) | 0.062" \pm 0.005" (1.57 mm \pm 0.13 mm) ¹ | Chemours 440, 450, 950, Daikin AP231SH |
| 3/4" | 0.750" \pm 0.005" (19.05 mm \pm 0.13 mm) | 0.062" \pm 0.005" (1.57 mm \pm 0.13 mm) | Chemours 440, 450, 950, Daikin AP231SH |
| 1" | 1.000" \pm 0.005" (25.40 mm \pm 0.13 mm) | 0.062" \pm 0.005" (1.57 mm \pm 0.13 mm) | Chemours 440, 450, 950, Daikin AP231SH |
| 1 1/4" | 1.250" \pm 0.007" (31.75 mm \pm 0.18 mm) | 0.075" \pm 0.007" (1.90 mm \pm 0.18 mm) | Chemours 440, 450 |
| 1 1/2" | 1.500" \pm 0.007" (38.10 mm \pm 0.18 mm) | 0.086" \pm 0.007" (2.18 mm \pm 0.18 mm) | Daikin AP231SH |
| 40 mm | 40 mm \pm 0.18 mm | 0.086" \pm 0.007" (2.18 mm \pm 0.18 mm) | Chemours 450, Daikin AP231SH |

¹Standard for PrimeLock® and Flaretek® fittings

| Size | Tube size OD | ID | Minimum bend radius | MOQ | Maximum roll length | Maximum reel length |
|-------|------------------|------------------|---------------------|--------|---------------------|---------------------|
| 1/8" | 0.125" (3.18 mm) | 0.065" (1.65 mm) | 0.5" (13 mm) | 500 ft | 500 ft | 5000 ft |
| 3/16" | 0.188" (4.76 mm) | 0.127" (3.23 mm) | 1.0" (25 mm) | 500 ft | 500 ft | 3000 ft |

SPECIFICATIONS

| Size | Tube size OD | ID | Minimum bend radius | MOQ | Maximum roll length | Maximum reel length |
|--------|-------------------|-------------------|---------------------|--------|---------------------|---------------------|
| 6 mm | 6 mm | 3.6 mm | 40 mm | 500 ft | 500 ft | 5000 ft |
| 1/4" | 0.250" (6.35 mm) | 0.190" (4.83 mm) | 2.0" (51 mm) | 500 ft | 500 ft | 2500 ft |
| 1/4" | 0.250" (6.35 mm) | 0.156" (3.96 mm) | 1.5" (38 mm) | 500 ft | 500 ft | 2500 ft |
| 1/4" | 0.250" (6.35 mm) | 0.126" (3.20 mm) | 1.5" (38 mm) | 500 ft | 500 ft | 2500 ft |
| 8 mm | 8 mm | 5.6 mm | 40 mm | 500 ft | 500 ft | 2000 ft |
| 5/16" | 0.312" (7.92 mm) | 0.252" (6.40 mm) | 2.2" (56 mm) | 500 ft | 500 ft | 2000 ft |
| 3/8" | 0.375" (9.52 mm) | 0.315" (8.00 mm) | 3.5" (89 mm) | 500 ft | 500 ft | 5000 ft |
| 3/8" | 0.375" (9.52 mm) | 0.251" (6.38 mm) | 2.0" (51 mm) | 500 ft | 500 ft | 5000 ft |
| 10 mm | 10 mm | 6.8 mm | 50 mm | 500 ft | 500 ft | 3500 ft |
| 12 mm | 12 mm | 8.8 mm | 70 mm | 500 ft | 500 ft | 4000 ft |
| 1/2" | 0.500" (12.70 mm) | 0.440" (11.18 mm) | 5.0" (127 mm) | 500 ft | 500 ft | 2000 ft |
| 1/2" | 0.500" (12.70 mm) | 0.376" (9.55 mm) | 2.3" (58 mm) | 500 ft | 500 ft | 4000 ft |
| 3/4" | 0.750" (19.05 mm) | 0.626" (15.90 mm) | 9.0" (229 mm) | 250 ft | 250 ft | 1500 ft |
| 1" | 1.000" (25.40 mm) | 0.876" (22.25 mm) | 11.0" (279 mm) | 250 ft | 250 ft | 750 ft |
| 1 1/4" | 1.250" (31.75 mm) | 1.100" (27.94 mm) | 12.5" (318 mm) | 500 ft | NA ² | 500 ft |
| 1 1/2" | 1.500" (38.10 mm) | 1.328" (33.73 mm) | 22.5" (572 mm) | 500 ft | NA ² | 500 ft |
| 40 mm | 40 mm | 1.398" (35.51 mm) | 22.5" (572 mm) | 500 ft | NA ² | 500 ft |

²Sold in full reels only

Laser Marking Codes

ENTEGRIS 440 4 0123456789

| Material | OD Size | Work Order Number |
|--------------------------------------|--------------------|--|
| 440 = FluoroLine AT high purity PFA | 4 = 1/4" (6.4 mm) | Work order number traceable to a specific material lot number, date manufactured, and production inspection record |
| 450 = FluoroLine UAT high purity PFA | 5 = 5/16" (7.9 mm) | |

SPECIFICATIONS

| | |
|--------------------------------------|-----------------------|
| 950 = FluoroLine XAT high purity PFA | 6 = 3/8" (9.5 mm) |
| 231 = FluoroLine XKT high purity PFA | 8 = 1/2" (12.7 mm) |
| | 12 = 3/4" (19.1 mm) |
| | 16 = 1" (25.4 mm) |
| | 20 = 1 1/4" (31.8 mm) |
| | 24 = 1 1/2" (38.1 mm) |
| | 25 = 1.57" (40 mm) |

Maximum Pressure Rating Chart

FluoroLine Ultrapure PFA Tubing

Maximum pressure capabilities of various sizes are listed below. (Flaretek nut ratings are included as a reference.) These ratings are provided as a guide in system design. The component with the lowest maximum pressure rating determines your system maximum pressure rating.

| Size (X) | Temperature °F (°C) | PVDF Nut FL(X)-1 psig (kPa) | PFA Nut FL(X)-3 psig (kPa) | CPFA Nut FL(X)-6 psig (kPa) | FlareLock® II PFA Nut FL(X)II-3 psig (kPa) | FluoroLine Ultrapure PFA Tubing psig (kPa) |
|----------|---------------------|-----------------------------|----------------------------|-----------------------------|--|--|
| 1/4" | 75 (24) | 225 (1551) | 225 (1551) | 225 (1551) | 225 (1551) | 273 (1882) |
| | 200 (93) | 133 (917) | 133 (917) | 133 (917) | 144 (993) | 136 (938) |
| | 250 (121) | 100 (689) | 100 (689) | 100 (689) | 120 (827) | 85 (586) |
| | 300 (150) | 75 (517) | 75 (517) | 75 (517) | 95 (655) | 61 (421) |
| | 350 (175) | N/R | 50 (345) | 50 (345) | 70 (483) | 36 (248) |
| | 400 (200) | N/R | N/R | 15 (103) | 45 (310) | N/R |
| 3/8" | 75 (24) | 225 (1551) | 225 (1551) | 225 (1551) | 225 (1551) | 234 (1613) |
| | 200 (93) | 133 (917) | 133 (917) | 133 (917) | 144 (993) | 116 (800) |
| | 250 (121) | 100 (689) | 100 (689) | 100 (689) | 120 (827) | 73 (503) |
| | 300 (150) | 75 (517) | 75 (517) | 75 (517) | 95 (655) | 52 (359) |
| | 350 (175) | N/R | 50 (345) | 50 (345) | 70 (483) | 31 (214) |
| | 400 (200) | N/R | N/R | 15 (103) | 45 (310) | N/R |
| 1/2" (8) | 75 (24) | 190 (1310) | 190 (1310) | 190 (1310) | 190 (1310) | 168 (1158) |
| | 200 (93) | 100 (689) | 100 (689) | 100 (689) | 105 (724) | 83 (572) |
| | 250 (121) | 75 (517) | 75 (517) | 75 (517) | 82 (565) | 52 (359) |
| | 300 (150) | 50 (345) | 50 (345) | 50 (345) | 58 (400) | 37 (255) |
| | 350 (175) | N/R | 40 (276) | 40 (276) | 55 (379) | 22 (152) |
| | 400 (200) | N/R | N/R | 15 (103) | 35 (241) | N/R |
| 3/4" | 75 (24) | 110 (758) | 110 (758) | 110 (758) | 140 (965) | 107 (738) |
| | 200 (93) | 76 (524) | 76 (524) | 76 (524) | 100 (689) | 53 (365) |

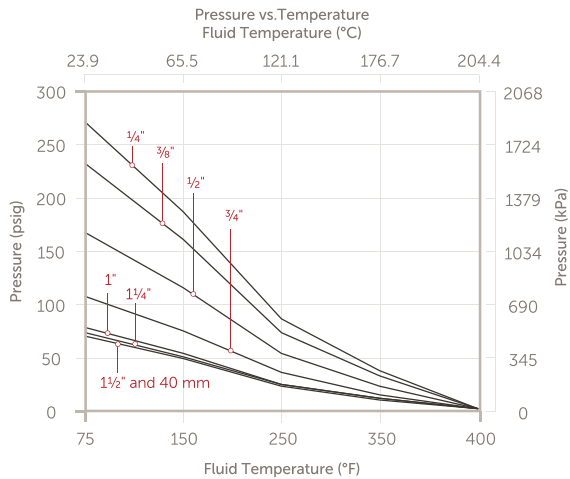
SPECIFICATIONS

| Size (X) | Temperature °F (°C) | PVDF Nut FL(X)-1 psig (kPa) | PFA Nut FL(X)-3 psig (kPa) | CPFA Nut FL(X)-6 psig (kPa) | FlareLock® II PFA Nut FL(X)II-3 psig (kPa) | FluoroLine Ultrapure PFA Tubing psig (kPa) |
|------------------|---------------------|-----------------------------|----------------------------|-----------------------------|--|--|
| | 250 (121) | 35 (241) | 35 (241) | 35 (241) | 47 (324) | 33 (228) |
| | 300 (150) | 27 (186) | 27 (186) | 27 (186) | 40 (276) | 24 (165) |
| | 350 (175) | N/R | 20 (138) | 20 (138) | 34 (234) | 14 (95.5) |
| | 400 (200) | N/R | N/R | 15 (103) | 27 (186) | N/R |
| 1" | 75 (24) | 75 (517) | 75 (517) | 75 (517) | 90 (620) | 77 (531) |
| | 200 (93) | 40 (276) | 40 (276) | 40 (276) | 50 (345) | 38 (262) |
| | 250 (121) | 28 (193) | 28 (193) | 28 (193) | 34 (234) | 24 (165) |
| | 300 (150) | 15 (103) | 15 (103) | 17 (117) | 20 (138) | 17 (117) |
| | 350 (175) | N/R | 15 (103) | 15 (103) | 17 (117) | 10 (68.9) |
| | 400 (200) | N/R | N/R | 15 (103) | 15 (103) | N/R |
| 1 1/4" | 75 (24) | 80 (552) | 80 (552) | * | N/A | 80 (552) |
| 1 1/2" and 40 mm | 75 (24) | N/A | 99 (682) | N/A | N/A | 69 (476) |

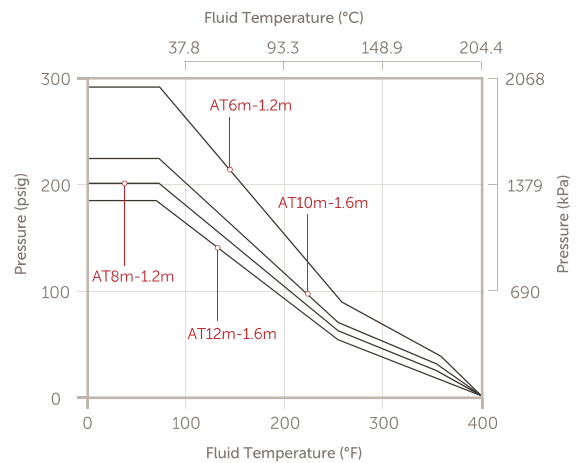
N/R = Not Rated
 N/A = Not Available
 * = Contact Entegris

PERFORMANCE DATA

Ratings for Standard Wall FluoroLine Tubing

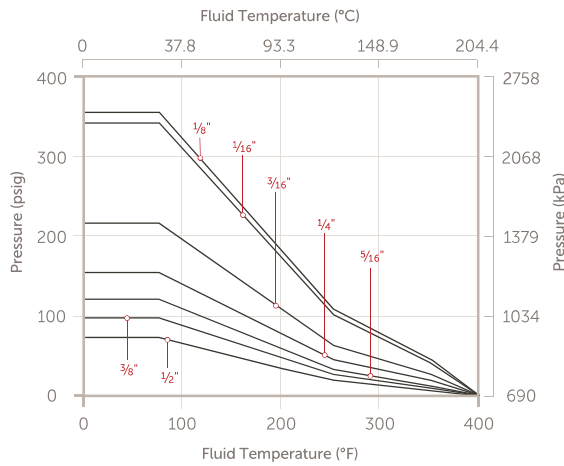


Ratings for Standard Wall FluoroLine Tubing Metric Size

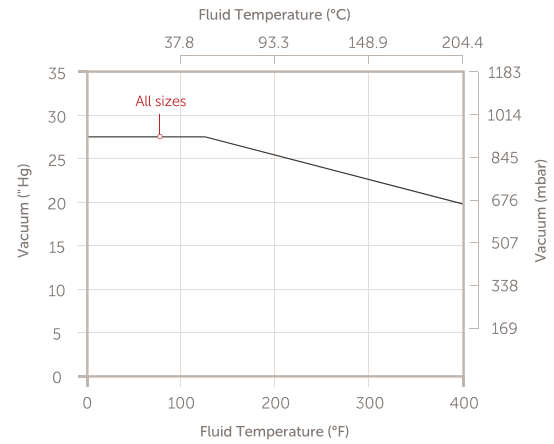


PERFORMANCE DATA

Ratings for Thin Wall FluoroLine PFA Tubing



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

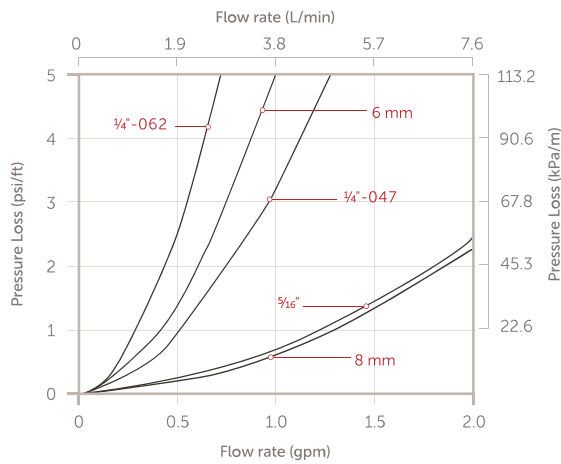


PRESSURE/TEMPERATURE RATINGS

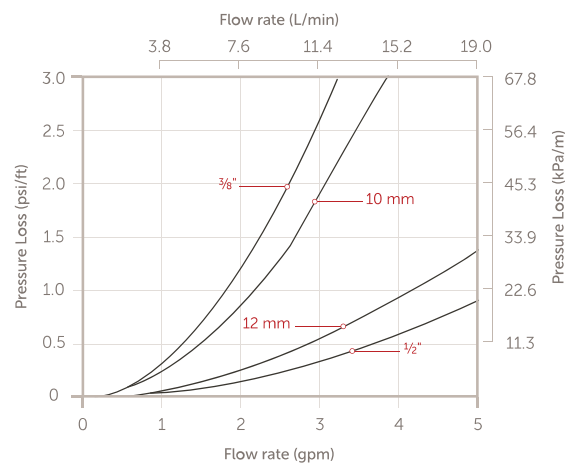
FluoroLine PFA tubing pressure ratings were established using ASTM D2837. This test exposes the tubing to long-term, constant pressures at various temperature settings. Our test took 22 months to complete. From the analysis, a hydrostatic design basis (HDB) value is multiplied by a safety design factor to obtain a hydrostatic design stress. The HDB value is used to determine the tubing operating parameters. FluoroLine PFA tubing completed this extensive testing.

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

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



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



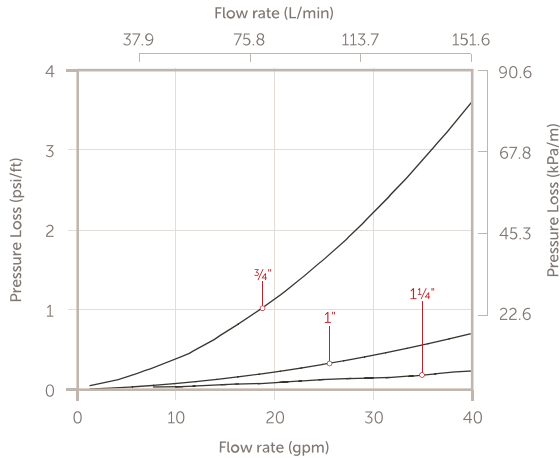
PRESSURE LOSS VS. FLOW

This data is for water (fluid with s.g. = 1.0).

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

PERFORMANCE DATA

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



PRESSURE LOSS VS. FLOW

This data is for water (fluid with s.g. = 1.0).

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

| | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|--|-------------|-----------|------------|---------------|-------------|---------------|------------|-----------|-------------|-----------|------------|-------------|------------|-------------|------------|--------------|---|------------------------|------------------------|------------------------|-------------------------|------------------------|------------------------|------------------------|------------------------|---|
| <p>Tube material</p> <p>AT = Chemours 440 UAT = Chemours 450 XAT = Chemours 950 XKT = Daikin AP231SH</p> | <p>Outside tube diameter*</p> <table border="0"> <tr> <td>015 = 1/16"</td> <td>1000 = 1"</td> </tr> <tr> <td>125 = 1/8"</td> <td>1250 = 1 1/4"</td> </tr> <tr> <td>187 = 3/16"</td> <td>1500 = 1 1/2"</td> </tr> <tr> <td>250 = 1/4"</td> <td>6M = 6 mm</td> </tr> <tr> <td>312 = 5/16"</td> <td>8M = 8 mm</td> </tr> <tr> <td>375 = 3/8"</td> <td>10M = 10 mm</td> </tr> <tr> <td>500 = 1/2"</td> <td>12M = 12 mm</td> </tr> <tr> <td>750 = 3/4"</td> <td>1570 = 40 mm</td> </tr> </table> | 015 = 1/16" | 1000 = 1" | 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 | 500 = 1/2" | 12M = 12 mm | 750 = 3/4" | 1570 = 40 mm | <p>Wall thickness</p> <table border="0"> <tr> <td>047 = 1.19 mm (0.047")</td> </tr> <tr> <td>1.2M = 1.20 mm (0.47")</td> </tr> <tr> <td>062 = 1.57 mm (0.062")</td> </tr> <tr> <td>1.6M = 1.60 mm (0.063")</td> </tr> <tr> <td>075 = 1.90 mm (0.075")</td> </tr> <tr> <td>086 = 2.18 mm (0.086")</td> </tr> <tr> <td>015 = 0.38 mm (0.015")</td> </tr> <tr> <td>030 = 0.76 mm (0.030")</td> </tr> </table> | 047 = 1.19 mm (0.047") | 1.2M = 1.20 mm (0.47") | 062 = 1.57 mm (0.062") | 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") | <p>Options</p> <p>(blank) = Standard UC = Ultrapure**</p> <p>Package***</p> <p>X = 10' straight (blank) = Roll/Reel</p> |
| 015 = 1/16" | 1000 = 1" | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 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 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 500 = 1/2" | 12M = 12 mm | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 750 = 3/4" | 1570 = 40 mm | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 047 = 1.19 mm (0.047") | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1.2M = 1.20 mm (0.47") | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 062 = 1.57 mm (0.062") | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 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 tube material is only available in 1/4", 3/8", 1/2", 3/4", 1", 1 1/4", and 40 mm outside tube diameters.

** Ultrapure (UC) option is only available with Chemours 450 LM (UAT) and Daikin AP231SH (XKT) tube materials.

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

Notes:

- Quantities between roll and reel length maximums will be packaged on a roll.
- Tight and consistent tolerances, along with lot-to-lot consistency are maintained using continuous online measurements of the FluoroLine tubing OD and wall thickness.

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.

TERMS AND CONDITIONS OF SALE

All purchases are subject to Entegris' Terms and Conditions of Sale. To view and print this information, visit entegris.com and select the [Terms & Conditions](#) link in the footer.



Corporate Headquarters
129 Concord
Billerica, MA 01821
USA

Customer Service
Tel +1 952 556 4181
Fax +1 952 556 8022
Toll Free 800 394 4083

Entegris®, the Entegris Rings Design®, and other product names are trademarks of Entegris, Inc. as listed on entegris.com/trademarks. All third-party product names, logos, and company names are trademarks or registered trademarks of their respective owners. Use of them does not imply any affiliation, sponsorship, or endorsement by the trademark owner.

©2017-2022 Entegris, Inc. | All rights reserved. | Printed in the USA | 3130-8473ENT-0924

www.entegris.com