

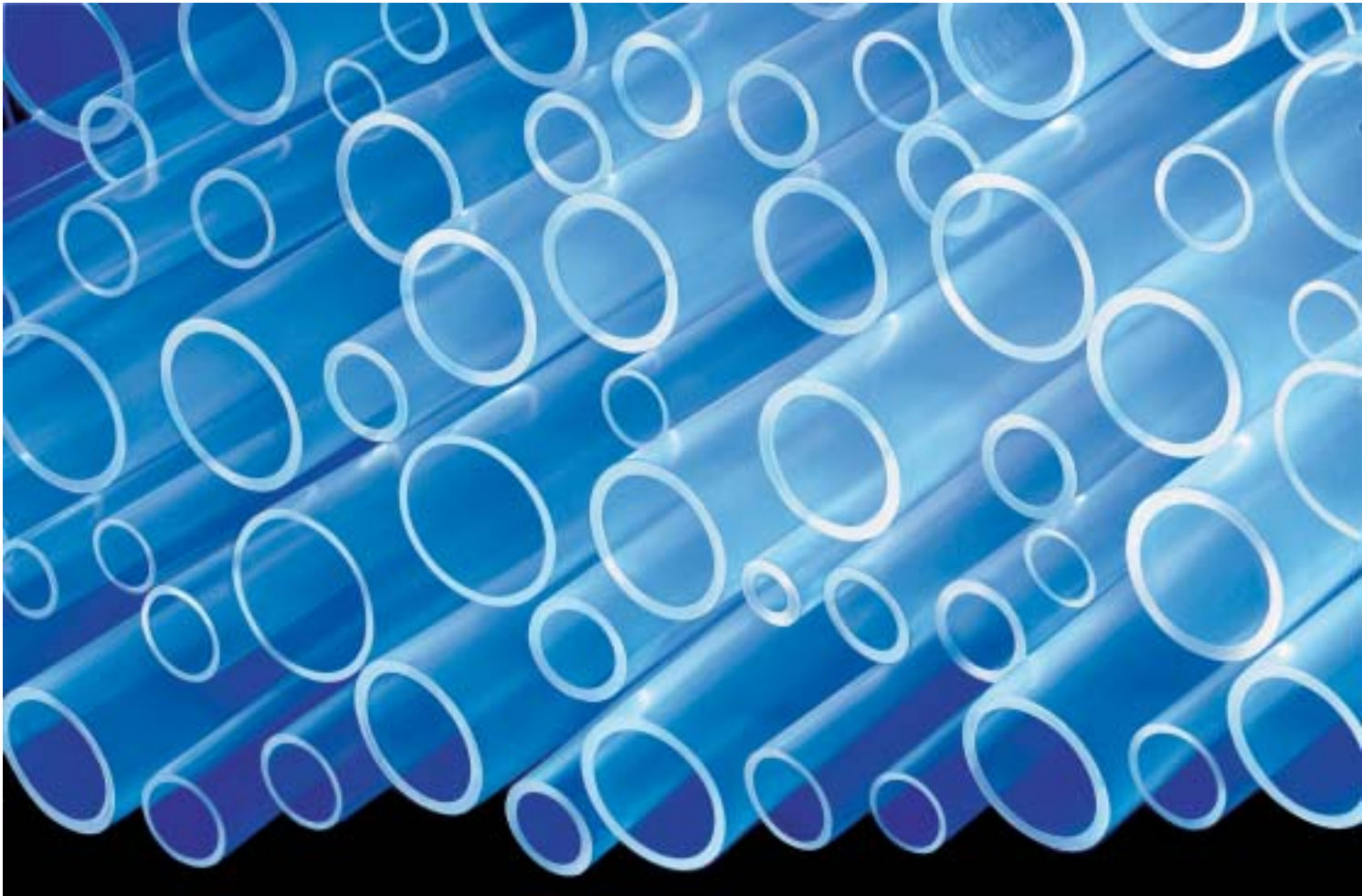


# Parflex/Atlantic

*Fluoropolymer Tubing Products*

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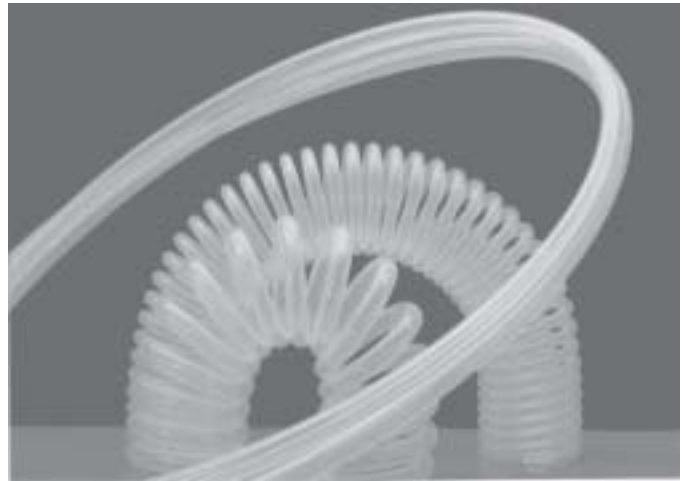
*Catalog 4150/USA*  
*March 2003 revised Sept. 2003*



Introduction .....	3
Part Number Matrix .....	3
Summary of Properties .....	4
<b>Fluid Handling Tubing &amp; Pipe</b>	
<b>HP PFA Products</b>	
Technical Information .....	5
Fractional Size Tubing .....	6
Metric Size Tubing .....	6
Retractable Coils .....	7
Schedule 40 Pipe .....	7
Dual Containment Tubing .....	8
<b>PFA Products</b>	
Technical Information .....	9
Fractional Size Tubing .....	10
Metric Size Tubing .....	11
Convolute Tubing .....	11
Retractable Coils .....	12
Schedule 40 Pipe .....	12
<b>FEP Products</b>	
Technical Information .....	13
Fractional Size Tubing .....	14
Metric Size Tubing .....	15
Convolute Tubing .....	15
Retractable Coils .....	16
Schedule 40 Pipe .....	16
<b>PTFE Products</b>	
Technical Information .....	17
Fractional Size Tubing .....	18
Metric Size Tubing .....	19
Convolute Tubing .....	19
<b>PVDF Products</b>	
Technical Information .....	20
Fractional Size Tubing .....	21
Metric Size Tubing .....	21
Schedule 40 Pipe .....	21
<b>Electrical Insulation Tubing</b>	
<b>Spaghetti Products</b>	
Fractional Spaghetti Tubing .....	22
PTFE AWG Spaghetti Tubing .....	23
<b>Heat Shrink Products</b>	
PTFE Fractional Heat Shrink Tubing (2:1), Industrial Wall .....	24
PTFE Fractional Heat Shrink Tubing (2:1) .....	24
PTFE AWG Heat Shrink Tubing (2:1) .....	25
FEP Fractional Heat Shrink Tubing (1.3:1) .....	26
FEP AWG Heat Shrink Tubing (1.3:1) .....	26
<b>PTFE Spiral Cut Cable Wrap .....</b>	<b>27</b>
<b>PTFE Round Beading/Miniature Rod .....</b>	<b>28</b>
<b>Convolute Products</b>	
PTFE Convolute Tubing .....	29
FEP Convolute Tubing .....	29
<b>Offer of Sale .....</b>	<b>32</b>

**Overview:**

Parflex/Atlantic manufactures an extensive line of high quality fluoropolymer tubing and pipe. A wide range of products are available in PTFE, FEP, PFA, High Purity PFA, and PVDF. Other materials such as ETFE, MFA and PEEK are also available on request (minimums will apply). All tubing and pipe products are made from 100% virgin resins. These fluoropolymers are resistant to numerous chemicals and solvents. A detailed outline of the chemical compatibility and other technical information is beyond the scope of this catalog. However, a comprehensive technical and chemical compatibility bulletin is available. Please contact Catalog Services and ask for Technical Bulletin 0002-T1/USA.



# Part Number Matrix

## 105-0250062-N40025-X

	<p><b>Outside Diameter</b>  <i>Example:</i>                  0250 = .250 Inches                  0700 = 7 mm</p>	<p><b>Wall Thickness</b>  <i>Example:</i>                  062 = .062 Inches                  100 = 1 mm</p>	<p><b>Packaging</b>                  1 = HP Spool                  2 = Plastic Spool                  3 = Wood Spool                  4 = Coil                  5 = Straight                  6 = Cardboard Spool                  0 = Other                  C = Cut Length (Inches)*</p>		
<p><b>Product Family</b>                  1 = Fractional                  2 = Metric                  3 = Convoluted                  4 = Spiral Cut                  5 = Pipe                  7 = Retractable Coils                  9 = Custom                  A = Formed Part</p>	<p><b>Resin</b>                  01 = PTFE                  02 = PTFE, Hose                  03 = FEP                  04 = PFA                  05 = PFA, HP Generic                  06 = PFA, Teflon® 450HP                  07 = PFA, Teflon® 440HP                  08 = PFA, UHP                  09 = MFA                  10 = PVDF                  11 = PVDF, Superflex                  12 = ETFE                  13 = PEEK                  14 = PTFE, Opaque</p>	<p><b>Solid Color*</b>                  0 = Black                  1 = Brown                  2 = Red                  3 = Orange                  4 = Yellow                  5 = Green                  6 = Blue                  7 = Violet                  8 = Gray                  9 = White                  N = Natural</p>	<p><b>Length</b>                  1000 = 1,000 ft.                  0500 = 500 ft.                  0250 = 250 ft.                  0100 = 100 ft.                  0050 = 50 ft.                  0025 = 25 ft.                  0010 = 10 ft.                  0005 = 5 ft.                  0004 = 4 ft.</p>	<p><b>Stripe Color*</b>                  Only add suffix if                  Stripe is <b>required</b>.                  0 = Black                  1 = Brown                  2 = Red                  3 = Orange                  4 = Yellow                  5 = Green                  6 = Blue                  7 = Violet                  8 = Gray                  9 = White</p>	

Teflon® is a registered trademark of DuPont.

Consult Price List for individual configuration pricing. For other configurations not listed on Price List, consult factory.  
 \*Additional charges may apply for colored, color stripes or cut pieces. Please consult the factory.

## Summary of Properties

## Fluoropolymer Tubing Products

The table below lists the summary of mechanical, electrical and thermal properties of the resins from which Parflex/Atlantic manufactures its line of tubing and pipe.

MECHANICAL PROPERTIES	ASTM	UNITS	PFA	FEP	PTFE	PVDF
Tensile Strength	D 1708	PSIG	4,000	3,500	2,500-4,000	D 638 13,300
Specific Gravity	D 792		2.15	2.15	2.13-2.24	1.8
Coefficient of Friction	Dynamic (<10 ft/min)		0.2	0.2	0.1	0.14 0.17
Compressive Strength	D 695	PSIG		2,200	3,500	11,600
Impact Strength 73°F	D 256	Ft-Lb/in	No Break	No Break	3.5	3-6
Flexural Modulus 73°F	D 790	PSIG	95,000	95,000	27,000	
Tensile Modulus	D 638	PSIG	40,000	60,000	80,000	348,000
Hardness-Durometer	D 2240		D-60	D-55	D-50-65	D-76-80
Elongation	D 1708	%	300	300	200-400	D 638 150
Flexural Strength	D 790	PSIG	No Break	No Break	No Break	10,750
Water Absorption	D 570	%	0.03	<0.01	<0.01	<0.04
Deformation Under Load (73°F, 1000 PSIG, 24 HR)	D 621		2.0	1.8	3.5	
Linear Coefficient of Expansion (70-212°F) (212-300°F) (300-408°F)	D 696	in/in/°F	6.7 x 10 <sup>5</sup> 9.4 x 10 <sup>5</sup> 11.1 x 10 <sup>5</sup>	4.5-5.8 x 10 <sup>5</sup>	3.8 5 x 10 <sup>5</sup> 4.2 5 x 10 <sup>5</sup> 5.0 5 x 10 <sup>5</sup>	7.1 x 10 <sup>5</sup>
Flex Life (MIT)			15,000	15,000	>1,000,000	
Creep Resistance	D 674	LB/Sq In	40,000			
ELECTRICAL PROPERTIES	ASTM	UNITS	PFA	FEP	PTFE	PVDF
Dielectric Strength (Short Term) 10Mil Film	D 149	V/Mil	>2,000	>2,000	>1,400	>1,080
Volume Resistivity	D 257	ohm-cm	10 <sup>18</sup>	>10 <sup>18</sup>	>10 <sup>18</sup>	10 <sup>13</sup>
Surface Resistivity	D 257	ohm/Sq	>10 <sup>17</sup>	>10 <sup>16</sup>	>10 <sup>18</sup>	
THERMAL PROPERTIES	ASTM	UNITS	PFA	FEP	PTFE	PVDF
Continuous Service Temperature		°F	500	400	500	235
Melting Point	DTA	°F	575-590	500-530	635-650	352
Thermal Conductivity	C-177	BTU/hr/ft <sup>2</sup> /°F. in	1.32	1.4	1.7	1.31
Heat of Fusion		BTU/lb	13	11	29-37	
Specific Heat 25°C 100°C 200°C 275°C	C-177	Cal/g/°C	0.256 0.283 0.334 0.391	0.26	0.23 0.25 0.27 0.29	.30-.34
Deflection Temperature 66 PSI 264 PSI		°F	166 118	138 134	252 131	235
Heat of Combustion		BTU/lb	2,200		2,200	
OTHER PROPERTIES	ASTM	UNITS	PFA	FEP	PTFE	PVDF
Flammability Rating	UL 94		VO	VO	VO	VO
Retractive Index	D 542		1.35	1.338	1.35	
Limiting Oxygen Index			>95	>95	>95	

**Product Overview:**

High Purity PFA (Perfluoroalkoxy) tubing, made from 100% virgin resin, has the highest molecular weight available. It is manufactured for use in hostile environments where purity is critical. Testing has proven that these High Purity PFA products are able to withstand corrosive surfactants for longer periods of time than the standard products. High Purity PFA products are available in various sizes upon request.

**Features:**

- 100% virgin PFA resin used on all products.
- Semiconductor and pharmaceutical specification conformance.
- Translucent and flexible materials.
- Chemically inert to nearly all industrial chemicals and solvents.
- Smooth nonstick surface resulting in the lowest coefficient of friction.
- Lowest levels of extractables.
- Nonflammable materials.
- FDA Compliant.

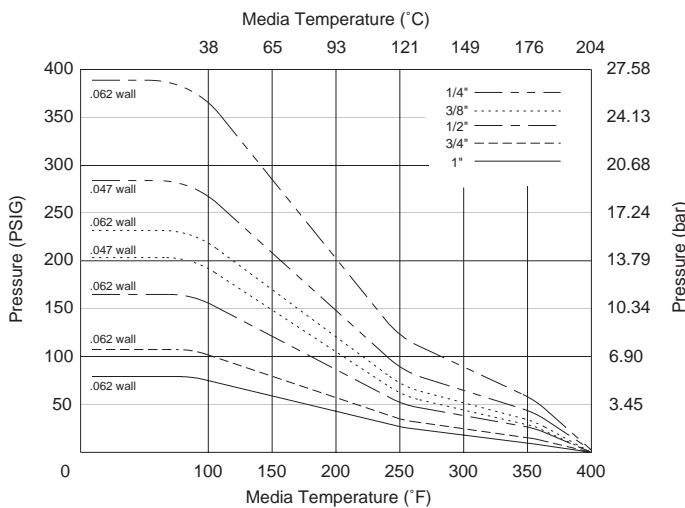
**Benefits:**

- No process contamination.
- High Purity applications.
- Excellent for flow monitoring systems.
- Longer product life and less downtime.
- Higher flow with no process contamination.
- Excellent for high purity applications.
- Safety.
- Useful in food applications.

**Specifications:**

- Materials:**  
Products in this catalog are manufactured using resins complying with ASTM D 3307 Type II Specification.
- Flammability:**  
Listed VW-1 by the Underwriters' Laboratories, Inc. in their burning test classification for polymeric materials and passes the UL 83 vertical flame test. In a flame situation, High Purity PFA tubing resists combustion and does not promote flame spread.
- FDA Compliance:**  
Most high purity PFA resins qualify for use in contact with food in compliance with FDA regulation 21 CFR 177.1550.
- Pressure and Temperature Ranges:**  
-329° - 500° F (-200° -260° C) See pressure temperature chart for more information or consult the factory.

Pressure vs. Temperature Chart  
Heavy Wall High Purity PFA Tubing  
Fractional Size



Tubing Size OD X ID X Wall	Minimum Bend Radius
1/8" X 1/16" X .031	1/2"
1/4" X 1/8" X .062	1/2"
1/4" X 5/32" X .047	3/4"
1/4" X 3/16" X .031	1"
3/8" X 1/4" X .062	3/4"
3/8" X 5/16" X .031	2-1/2"
1/2" X 3/8" X .062	2-1/2"
1/2" X 7/16" X .031	4"
5/8" X 1/2" X .062	3"
5/8" X 9/16" X .031	12"
3/4" X 5/8" X .062	6"
3/4" X 11/16" X .032	16"
7/8" X 3/4" X .062	12"
1" X 7/8" X .062	16"
1-1/4" X 1.10 X .075	16"

Part numbers below are for standard configurations. For complete part numbers and options for material, color, packaging, etc. refer to Part Number Matrix on page 4.

**Industrial Wall Fractional Size Tubing**

OD	Part Number	OD X ID X Wall	Nominal OD	OD Tolerance	Wall Tolerance	Working PSIG (bar)	Burst PSIG (bar)
1/8"	105-0125031-XXXXXX	1/8" X 1/16" X .031	.125	+/- .004	+/- .003	369 (25.4)	1,859 (128.2)
3/16"	105-0188031-XXXXXX	3/16" X 1/8" X .031	.188	+/- .005	+/- .003	249 (17.1)	1,253 (86.4)
1/4"	105-0250031-XXXXXX	1/4" X 3/16" X .031	.250	+/- .005	+/- .003	190 (13.1)	945 (65.2)
3/8"	105-0375031-XXXXXX	3/8" X 5/16" X .031	.375	+/- .005	+/- .003	125 (8.6)	633 (43.6)
1/2"	105-0500031-XXXXXX	1/2" X 7/16" X .031	.500	+/- .006	+/- .003	95 (6.6)	476 (32.8)
3/4"	105-0750032-XXXXXX	3/4" X 11/16" X .032	.750	+/- .006	+/- .003	68 (4.7)	318 (21.9)

**Heavy Wall Fractional Size Tubing**

OD	Part Number	OD X ID X Wall	Nominal OD	OD Tolerance	Wall Tolerance	Working PSIG (bar)	Burst PSIG (bar)
3/16"	105-0188062-XXXXXX	3/16" X 1/16" X .062	.188	+/- .005	+/- .003	492 (33.9)	2,478 (170.9)
1/4"	105-0250047-XXXXXX 105-0250062-XXXXXX	1/4" X 5/32" X .047 1/4" X 1/8" X .062	.250	+/- .005	+/- .003	286 (19.7) 380 (26.2)	1,443 (99.5) 1,889 (130.2)
3/8"	105-0375062-XXXXXX	3/8" X 1/4" X .062	.375	+/- .005	+/- .003	260 (17.9)	1,280 (88.3)
1/2"	105-0500062-XXXXXX	1/2" X 3/8" X .062	.500	+/- .005	+/- .003	195 (13.4)	968 (66.7)
3/4"	105-0750062-XXXXXX	3/4" X 5/8" X .062	.750	+/- .006	+/- .003	132 (9.1)	650 (44.8)
1"	105-1000062-XXXXXX	1" X 7/8" X .062	1.000	+/- .010	+/- .003	100 (6.9)	490 (33.8)
1-1/8"	105-1125062-XXXXXX	1-1/8" X 1" X .062	1.125	+/- .015	+/- .003	87 (6.0)	436 (30.1)
1-1/4"	105-1250075-XXXXXX	1-1/4" X 1.10 X .075	1.250	+/- .015	+/- .003	94 (6.5)	474 (32.7)

Pressures above are for operation at 73°F. Working pressure calculated using a Safety Factor of 5. Note other manufacturers may use a Safety Factor of 4. Fractional tubing is supplied in 25 ft. increments up to 1000 ft. continuous for sizes up to 1" OD. Consult factory for standard packaging on sizes greater than 1" OD. Custom packaging and sizes are quoted upon request.

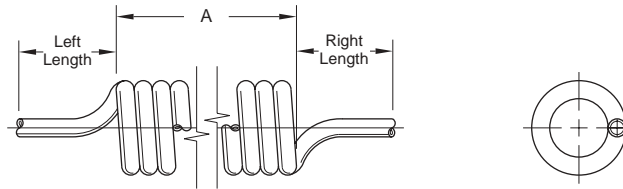
**Metric Size Tubing**

OD	Part Number	OD X ID mm	OD X ID Inch	OD / ID Tolerance mm	OD / ID Tolerance Inch
3	205-0300100-XXXXXX	3.0 X 1.0	.118 X .039	+/- .11	+/- .004
4	205-0400100-XXXXXX	4.0 X 2.0	.157 X .078	+/- .11	+/- .004
5	205-0500100-XXXXXX	5.0 X 3.0	.197 X .118	+/- .11	+/- .004
6	205-0600100-XXXXXX	6.0 X 4.0	.236 X .157	+/- .13	+/- .005
7	205-0700100-XXXXXX	7.0 X 5.0	.276 X .197	+/- .13	+/- .005
8	205-0800100-XXXXXX	8.0 X 6.0	.315 X .236	+/- .13	+/- .005
9	205-0900100-XXXXXX	9.0 X 7.0	.354 X .276	+/- .13	+/- .005
10	205-1000100-XXXXXX	10.0 X 8.0	.393 X .315	+/- .13	+/- .005
12	205-1200100-XXXXXX	12.0 X 10.0	.472 X .393	+/- .15	+/- .006
14	205-1400100-XXXXXX	14.0 X 12.0	.551 X .472	+/- .15	+/- .006
16	205-1600100-XXXXXX	16.0 X 14.0	.630 X .551	+/- .15	+/- .006

Consult factory for pressure ratings.



**Retractable Coils**



Part Number	OD X ID	Coil ID Inch (mm)	Retracted Length "A" Inch (mm)	Extended Length Inch (mm)
705-0188062-XX0003	3/16" X 1/16"	.750 (19.1)	3 (76)	12 (305)
705-0188062-XX0006	3/16" X 1/16"	.750 (19.1)	6 (152)	24 (610)
705-0188062-XX0012	3/16" X 1/16"	.750 (19.1)	12 (305)	48 (1219)
705-0188062-XX0018	3/16" X 1/16"	.750 (19.1)	18 (457)	72 (1829)
705-0250062-XX0003	1/4" X 1/8"	1.00 (25.4)	3 (76)	12 (305)
705-0250062-XX0006	1/4" X 1/8"	1.00 (25.4)	6 (152)	24 (610)
705-0250062-XX0012	1/4" X 1/8"	1.00 (25.4)	12 (305)	48 (1219)
705-0250062-XX0018	1/4" X 1/8"	1.00 (25.4)	18 (457)	72 (1829)
705-0312062-XX0003	5/16" X 3/16"	1.625 (41.3)	3 (76)	12 (305)
705-0312062-XX0006	5/16" X 3/16"	1.625 (41.3)	6 (152)	24 (610)
705-0312062-XX0012	5/16" X 3/16"	1.625 (41.3)	12 (305)	48 (1219)
705-0312062-XX0018	5/16" X 3/16"	1.625 (41.3)	18 (457)	72 (1829)
705-0375062-XX0003	3/8" X 1/4"	1.625 (41.3)	3 (76)	12 (305)
705-0375062-XX0006	3/8" X 1/4"	1.625 (41.3)	6 (152)	24 (610)
705-0375062-XX0012	3/8" X 1/4"	1.625 (41.3)	12 (305)	48 (1219)
705-0375062-XX0015	3/8" X 1/4"	1.625 (41.3)	15 (381)	60 (1524)
705-0375062-XX0018	3/8" X 1/4"	1.625 (41.3)	18 (457)	72 (1829)
705-0438062-XX0003	7/16" X 5/16"	3.00 (76.2)	3 (76)	12 (305)
705-0438062-XX0006	7/16" X 5/16"	3.00 (76.2)	6 (152)	24 (610)
705-0438062-XX0012	7/16" X 5/16"	3.00 (76.2)	12 (305)	48 (1219)
705-0500062-XX0003	1/2" X 3/8"	3.00 (76.2)	3 (76)	12 (305)
705-0500062-XX0006	1/2" X 3/8"	3.00 (76.2)	6 (152)	24 (610)
705-0500062-XX0012	1/2" X 3/8"	3.00 (76.2)	12 (305)	48 (1219)

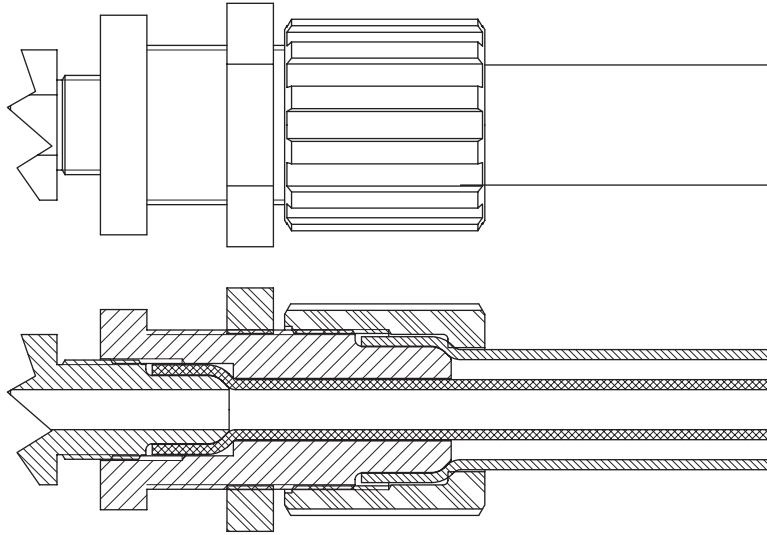
Standard left/right tail length is 6 inches. Please consult factory for special coil lengths and/or ID's.

**Schedule 40 Pipe**

Part Number	Nominal Inch Size	Actual OD Inch	Minimum Wall Inch	OD Tolerance Inch	Wall Tolerance Inch
505-0540088-XXXXXX	1/4"	.540	.088	+/- .010	+ .020 / -.00
505-0840109-XXXXXX	1/2"	.840	.109	+/- .010	+ .020 / -.00
505-1050113-XXXXXX	3/4"	1.050	.113	+/- .010	+ .020 / -.00
505-1315133-XXXXXX	1"	1.315	.133	+/- .015	+ .020 / -.00
505-2375154-XXXXXX	2"	2.375	.154	+/- .015	+ .020 / -.00

Pipe is supplied in 5 and 10 foot straights (i.e. 505-0540088-**N50010**). Custom packaging, lengths, and schedule 80 pipe are quoted upon request.

**Dual Containment Tubing**



Part Number	Line	OD X ID X Wall	Nominal OD	OD Tolerance	Wall Tolerance	Standard Packaging
DUALCONHP 02500500LM	Process Containment	1/4" X 5/32" X .047 1/2" X 3/8" X .062	.250 .500	+/- .005 +/- .005	+/- .003 +/- .003	300 ft. spool
DUALCONHP 05000750LM	Process Containment	1/2" X 3/8" X .062 3/4" X 5/8" X .062	.500 .750	+/- .005 +/- .006	+/- .003 +/- .003	300 ft. spool
DUALCONHP 07501000LM	Process Containment	3/4" X 5/8" X .062 1" X 7/8" X .062	.750 1.000	+/- .005 +/- .010	+/- .003 +/- .003	300 ft. spool

Dual containment tubing provides long continuous lengths while reducing the number of connections and welding joints. The design utilizes a HP PFA inner process line for excellent chemical resistance. The FEP outer containment line provides clear visibility of the inner process line. Both process and containment lines are laser marked for traceability. Consult the factory for custom packaging, other resins and sizes, or more information.



**Product Overview:**

Parflex/Atlantic's line of Fluoropolymer tubing is well suited for any corrosive or high purity application. PFA Tubing Products are available in several grades and sizes, and are offered in numerous lengths. PFA (Perfluoroalkoxy) is the material of choice in applications requiring excellent chemical resistance, high temperature exposure, clarity and long continuous lengths. Parflex/Atlantic's resin is a standard grade with a high molecular weight and high resistance to stress cracking. The tubing can be used with flare or conventional fittings, and is available in a wide range of sizes. Schedule 40 Pipe is also available.

**Features:**

- 100% virgin PFA resin used on all products.**
- Translucent and flexible materials.**
- Chemically inert to nearly all industrial chemicals and solvents.**
- Smooth nonstick surface resulting in the lowest coefficient of friction.**
- Low permeability.**
- Nonflammable materials.**
- FDA Compliant.**
- Weather resistant.**

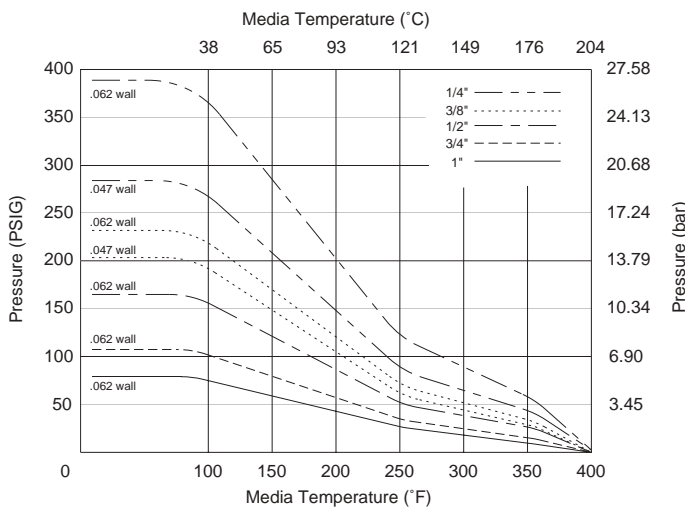
**Benefits:**

- No process contamination.**
- Excellent for flow monitoring systems.**
- Longer product life and less downtime.**
- Higher flow with no process contamination.**
- Useful in severe chemical and gas service.**
- Safety.**
- Useful in food applications.**
- Excellent for outdoor use in extreme conditions.**

**Specifications:**

- Materials:**  
Products in this catalog are manufactured using resins complying with ASTM D 3307 Specification.
- Flammability:**  
Listed VW-1 by the Underwriters' Laboratories, Inc. in their burning test classification for polymeric materials and passes the UL 83 vertical flame test. In a flame situation, PFA tubing resists combustion and does not promote flame spread.
- FDA Compliance:**  
Most PFA resins qualify for use in contact with food in compliance with FDA regulation 21 CFR 177.1550.
- Pressure and Temperature Ranges:**  
-329° - 500° F (-200° -260° C) See pressure temperature chart for more information or consult the factory.

Pressure vs. Temperature Chart  
Heavy Wall PFA Tubing  
Fractional Size



Tubing Size OD X ID X Wall	Minimum Bend Radius
1/8" X 1/16" X .031	1/2"
1/4" X 1/8" X .062	1/2"
1/4" X 5/32" X .047	3/4"
1/4" X 3/16" X .031	1"
5/16" X 3/16" X .062	1/2"
5/16" X 1/4" X .031	1-3/4"
3/8" X 1/4" X .062	3/4"
3/8" X 5/16" X .031	2-1/2"
1/2" X 3/8" X .062	2-1/2"
1/2" X 7/16" X .031	4"
5/8" X 1/2" X .062	3"
5/8" X 9/16" X .031	12"
3/4" X 5/8" X .062	6"
3/4" X 11/16" X .032	16"
7/8" X 3/4" X .062	12"
1" X 7/8" X .062	16"
1-1/4" X 1.10 X .075	16"

Part numbers below are for standard configurations. For complete part numbers and options for material, color, packaging, etc. refer to Part Number Matrix on page 4.

### Industrial Wall Fractional Size Tubing

OD	Part Number	OD X ID X Wall	Nominal OD	OD Tolerance	Wall Tolerance	Working PSIG (bar)	Burst PSIG (bar)
3/32"	104-0094031-XXXXXX	3/32" X 1/32" X .031	.094	+/- .004	+/- .003	487 (33.6)	2,453 (169.1)
1/8"	104-0125031-XXXXXX	1/8" X 1/16" X .031	.125	+/- .004	+/- .003	369 (25.4)	1,859 (128.2)
5/32"	104-0156031-XXXXXX	5/32" X 3/32" X .031	.157	+/- .005	+/- .003	297 (20.5)	1,497 (103.2)
3/16"	104-0188031-XXXXXX	3/16" X 1/8" X .031	.188	+/- .005	+/- .003	249 (17.1)	1,253 (86.4)
1/4"	104-0250031-XXXXXX	1/4" X 3/16" X .031	.250	+/- .005	+/- .003	190 (13.1)	945 (65.2)
5/16"	104-0312031-XXXXXX	5/16" X 1/4" X .031	.312	+/- .005	+/- .003	150 (10.4)	758 (52.3)
3/8"	104-0375031-XXXXXX	3/8" X 5/16" X .031	.375	+/- .005	+/- .003	125 (8.6)	633 (43.6)
7/16"	104-0438031-XXXXXX	7/16" X 3/8" X .031	.438	+/- .005	+/- .003	108 (7.4)	543 (37.5)
1/2"	104-0500031-XXXXXX	1/2" X 7/16" X .031	.500	+/- .006	+/- .003	95 (6.6)	476 (32.8)
9/16"	104-0563031-XXXXXX	9/16" X 1/2" X .031	.563	+/- .006	+/- .003	84 (5.8)	424 (29.2)
5/8"	104-0625031-XXXXXX	5/8" X 9/16" X .031	.625	+/- .006	+/- .003	75 (5.2)	381 (26.7)
11/16"	104-0688031-XXXXXX	11/16" X 5/8" X .031	.688	+/- .006	+/- .003	69 (4.7)	347 (23.9)
3/4"	104-0750032-XXXXXX	3/4" X 11/16" X .032	.750	+/- .006	+/- .003	68 (4.7)	318 (21.9)
.830	104-0830040-XXXXXX	.830 X 3/4" X .040	.830	+/- .006	+/- .003	76 (5.2)	381 (26.3)
.965	104-0965045-XXXXXX	.965 X 7/8" X .045	.965	+/- .007	+/- .003	73 (5.1)	369 (25.5)
1.10	104-1100050-XXXXXX	1.10 X 1" X .050	1.100	+/- .007	+/- .004	58 (4.0)	294 (20.3)
1.205	104-1205040-XXXXXX	1.205 X 1-1/8" X .040	1.205	+/- .015	+/- .004	52 (3.6)	264 (18.2)
1.330	104-1330040-XXXXXX	1.330 X 1-1/4" X .040	1.330	+/- .015	+/- .004	47 (3.3)	239 (16.5)
1.580	104-1580040-XXXXXX	1.580 X 1-1/2" X .040	1.580	+/- .015	+/- .004	40 (2.8)	201 (13.9)

### Heavy Wall Fractional Size Tubing

OD	Part Number	OD X ID X Wall	Nominal OD	OD Tolerance	Wall Tolerance	Working PSIG (bar)	Burst PSIG (bar)
3/16"	104-0188062-XXXXXX	3/16" X 1/16" X .062	.188	+/- .005	+/- .003	492 (33.9)	2,478 (170.9)
1/4"	104-0250047-XXXXXX 104-0250062-XXXXXX	1/4" X 5/32" X .047 1/4" X 1/8" X .062	.250	+/- .005	+/- .003	286 (19.7) 380 (26.2)	1,443 (99.5) 1,889 (130.2)
5/16"	104-0312062-XXXXXX	5/16" X 3/16" X .062	.312	+/- .005	+/- .003	303 (20.9)	1,525 (105.2)
3/8"	104-0375062-XXXXXX	3/8" X 1/4" X .062	.375	+/- .005	+/- .003	260 (17.9)	1,280 (88.3)
7/16"	104-0438062-XXXXXX	7/16" X 5/16" X .062	.438	+/- .005	+/- .003	219 (15.1)	1,102 (76.0)
1/2"	104-0500062-XXXXXX	1/2" X 3/8" X .062	.500	+/- .005	+/- .003	195 (13.4)	968 (66.7)
9/16"	104-0563062-XXXXXX	9/16" X 7/16" X .062	.563	+/- .006	+/- .003	171 (11.8)	862 (59.5)
5/8"	104-0625062-XXXXXX	5/8" X 1/2" X .062	.625	+/- .006	+/- .003	160 (11.0)	778 (53.6)
11/16"	104-0688062-XXXXXX	11/16" X 9/16" X .062	.688	+/- .006	+/- .003	141 (9.7)	708 (48.8)
3/4"	104-0750062-XXXXXX	3/4" X 5/8" X .062	.750	+/- .006	+/- .003	132 (9.1)	650 (44.8)
7/8"	104-0875062-XXXXXX	7/8" X 3/4" X .062	.875	+/- .007	+/- .003	112 (7.7)	559 (38.5)
1"	104-1000062-XXXXXX	1" X 7/8" X .062	1.000	+/- .010	+/- .003	100 (6.9)	490 (33.8)
1-1/8"	104-1125062-XXXXXX	1-1/8" X 1" X .062	1.125	+/- .015	+/- .004	87 (6.0)	436 (30.1)
1-1/4"	104-1250062-XXXXXX	1-1/4" X 1-1/8" X .062	1.250	+/- .015	+/- .004	78 (5.4)	393 (27.1)
1-3/8"	104-1375062-XXXXXX	1-3/8" X 1-1/4" X .062	1.375	+/- .015	+/- .004	71 (4.9)	357 (24.6)
2-1/8"	104-2125062-XXXXXX	2-1/8" X 2" X .062	2.125	+/- .015	+/- .004	46 (3.2)	232 (16.0)

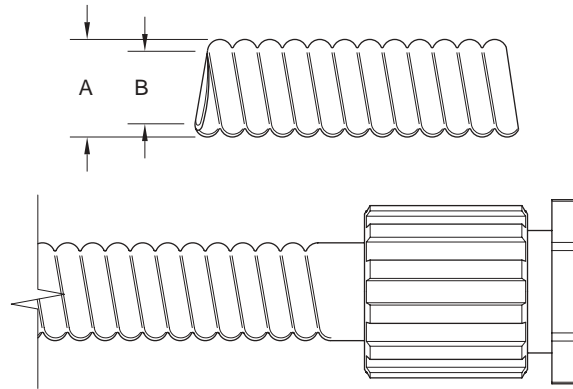
Pressures above are for operation at 73°F. Working pressure calculated using a Safety Factor of 5. Note other manufacturers may use a Safety Factor of 4. Fractional tubing is supplied in 25 ft. increments up to 1000 ft. continuous for sizes up to 1" OD. Consult factory for standard packaging on sizes greater than 1" OD. Custom packaging and sizes are quoted upon request.

**Metric Size Tubing**

OD	Part Number	OD X ID mm	OD X ID Inch	OD / ID Tolerance mm	OD / ID Tolerance Inch
3	204-0300100-XXXXXX	3.0 X 1.0	.118 X .039	+/- .11	+/- .004
4	204-0400100-XXXXXX	4.0 X 2.0	.157 X .078	+/- .11	+/- .004
5	204-0500100-XXXXXX	5.0 X 3.0	.197 X .118	+/- .11	+/- .004
6	204-0600100-XXXXXX	6.0 X 4.0	.236 X .157	+/- .13	+/- .005
7	204-0700100-XXXXXX	7.0 X 5.0	.276 X .197	+/- .13	+/- .005
8	204-0800100-XXXXXX	8.0 X 6.0	.315 X .236	+/- .13	+/- .005
9	204-0900100-XXXXXX	9.0 X 7.0	.354 X .276	+/- .13	+/- .005
10	204-1000100-XXXXXX	10.0 X 8.0	.393 X .315	+/- .13	+/- .005
12	204-1200100-XXXXXX	12.0 X 10.0	.472 X .393	+/- .15	+/- .006
14	204-1400100-XXXXXX	14.0 X 12.0	.551 X .472	+/- .15	+/- .006
16	204-1600100-XXXXXX	16.0 X 14.0	.630 X .551	+/- .15	+/- .006

Consult factory for pressure ratings.

**Convoluting Tubing**

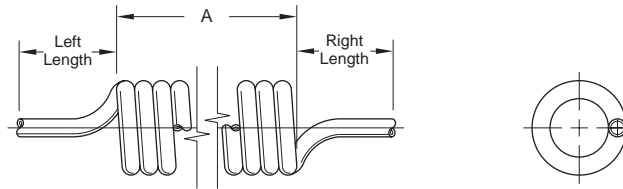


OPTION WITH FLARE NUT ASSEMBLY  
CONSULT FACTORY FOR PRICING

Part Number	OD "A" X ID "B"	Nominal Wall	Bend Radius	Pitch
304-0375020-XXXXXX	3/8" X 1/4"	.020	1/2"	8
304-0500023-XXXXXX	1/2" X 3/8"	.023	3/4"	8
304-0750025-XXXXXX	3/4" X 5/8"	.025	1-1/2"	8
304-1000025-XXXXXX	1" X 7/8"	.025	2-1/2"	8

Convoluted tubing is used in applications where smaller bend diameters are required. Convoluted tubing is made to order. Custom sizes, colors, packaging, and PTFE liners are also available. Please consult factory.

**Retractable Coils**



Part Number	OD X ID	Coil ID Inch (mm)	Retracted Length "A" Inch (mm)	Extended Length Inch (mm)
704-0188062-XX0003	3/16" X 1/16"	.750 (19.1)	3 (76)	12 (305)
704-0188062-XX0006	3/16" X 1/16"	.750 (19.1)	6 (152)	24 (610)
704-0188062-XX0012	3/16" X 1/16"	.750 (19.1)	12 (305)	48 (1219)
704-0188062-XX0018	3/16" X 1/16"	.750 (19.1)	18 (457)	72 (1829)
704-0250062-XX0003	1/4" X 1/8"	1.00 (25.4)	3 (76)	12 (305)
704-0250062-XX0006	1/4" X 1/8"	1.00 (25.4)	6 (152)	24 (610)
704-0250062-XX0012	1/4" X 1/8"	1.00 (25.4)	12 (305)	48 (1219)
704-0250062-XX0018	1/4" X 1/8"	1.00 (25.4)	18 (457)	72 (1829)
704-0312062-XX0003	5/16" X 3/16"	1.625 (41.3)	3 (76)	12 (305)
704-0312062-XX0006	5/16" X 3/16"	1.625 (41.3)	6 (152)	24 (610)
704-0312062-XX0012	5/16" X 3/16"	1.625 (41.3)	12 (305)	48 (1219)
704-0312062-XX0018	5/16" X 3/16"	1.625 (41.3)	18 (457)	72 (1829)
704-0375062-XX0003	3/8" X 1/4"	1.625 (41.3)	3 (76)	12 (305)
704-0375062-XX0006	3/8" X 1/4"	1.625 (41.3)	6 (152)	24 (610)
704-0375062-XX0012	3/8" X 1/4"	1.625 (41.3)	12 (305)	48 (1219)
704-0375062-XX0015	3/8" X 1/4"	1.625 (41.3)	15 (381)	60 (1524)
704-0375062-XX0018	3/8" X 1/4"	1.625 (41.3)	18 (457)	72 (1829)
704-0438062-XX0003	7/16" X 5/16"	3.00 (76.2)	3 (76)	12 (305)
704-0438062-XX0006	7/16" X 5/16"	3.00 (76.2)	6 (152)	24 (610)
704-0438062-XX0012	7/16" X 5/16"	3.00 (76.2)	12 (305)	48 (1219)
704-0500062-XX0003	1/2" X 3/8"	3.00 (76.2)	3 (76)	12 (305)
704-0500062-XX0006	1/2" X 3/8"	3.00 (76.2)	6 (152)	24 (610)
704-0500062-XX0012	1/2" X 3/8"	3.00 (76.2)	12 (305)	48 (1219)

Standard left/right tail length is 6 inches. Please consult factory for special coil lengths and/or ID's.

**Schedule 40 Pipe**

Part Number	Nominal Inch Size	Actual OD Inch	Minimum Wall Inch	OD Tolerance Inch	Wall Tolerance Inch
504-0540088-XXXXXX	1/4"	.540	.088	+/- .010	+ .020 / -.00
504-0840109-XXXXXX	1/2"	.840	.109	+/- .010	+ .020 / -.00
504-1050113-XXXXXX	3/4"	1.050	.113	+/- .010	+ .020 / -.00
504-1315133-XXXXXX	1"	1.315	.133	+/- .015	+ .020 / -.00
504-2375154-XXXXXX	2"	2.375	.154	+/- .015	+ .020 / -.00

Pipe is supplied in 5 and 10 foot straights (i.e. 504-0540088-**N50010**). Custom packaging, lengths, and schedule 80 pipe are quoted upon request. Please consult factory.

**Product Overview:**

Parflex/Atlantic's line of FEP (Fluorinated Ethylene Propylene) tubing exhibits the highest clarity offered. This clarity makes this tubing ideal for flow monitoring applications. FEP also uses a high molecular weight resin that has the best stress crack resistance. It is also widely used in water purification systems due to its excellent transmission of UV light. FEP resin meets the FDA requirements for repeated food contact. The product is available in various sizes of tubing and pipe.

**Features:**

- 100% virgin FEP resin used on all products.**
- Most translucent Fluoropolymer available.**
- Chemically inert to nearly all industrial chemicals and solvents.**
- High abrasion resistance and thermal stability.**
- Low permeability.**
- Nonflammable materials.**
- FDA Compliant.**

**Benefits:**

- Highest quality products.**
- Excellent for flow monitoring applications.**
- Longer product life and less downtime.**
- Useful in applications requiring thermal cycling.**
- Useful in severe chemical and gas service.**
- Safety.**
- Useful in food applications.**

**Specifications:**

- Materials:**  
FEP products in this catalog are manufactured using resins complying with ASTM D 3296-98 Specification.
- Flammability:**  
Listed VW-1 by the Underwriters' Laboratories, Inc. in their burning test classification for polymeric materials and passes the UL 83 vertical flame test. In a flame situation, FEP tubing resists combustion and does not promote flame spread.
- FDA Compliance:**  
Most FEP resins qualify for use in contact with food in compliance with FDA regulation 21 CFR 177.1550.
- Temperature Ranges:**  
-410° - 400° F (-246° -204° C) More pressure temperature information is available from the factory upon request.

<i>Tubing Size OD X ID X Wall</i>	<i>Minimum Bend Radius</i>
1/8" X 1/16" X .031	1/2"
1/4" X 1/8" X .062	1/2"
1/4" X 5/32" X .047	3/4"
1/4" X 3/16" X .031	1"
5/16" X 3/16" X .062	1/2"
5/16" X 1/4" X .031	1-3/4"
3/8" X 1/4" X .062	3/4"
3/8" X 5/16" X .031	2-1/2"
1/2" X 3/8" X .062	2-1/2"
1/2" X 7/16" X .031	4"
5/8" X 1/2" X .062	3"
5/8" X 9/16" X .031	12"
3/4" X 5/8" X .062	6"
3/4" X 11/16" X .032	16"
7/8" X 3/4" X .062	12"
1" X 7/8" X .062	16"

Part numbers below are for standard configurations. For complete part numbers and options for material, color, packaging, etc. refer to Part Number Matrix on page 4.

### Industrial Wall Fractional Size Tubing

OD	Part Number	OD X ID X Wall	Nominal OD	OD Tolerance	Wall Tolerance	Working PSIG (bar)	Burst PSIG (bar)
3/32"	103-0094031-XXXXXX	3/32" X 1/32" X .031	.094	+/- .004	+/- .003	389 (26.8)	1,962 (135.3)
1/8"	103-0125031-XXXXXX	1/8" X 1/16" X .031	.125	+/- .004	+/- .003	295 (20.3)	1,487 (102.5)
5/32"	103-0156031-XXXXXX	5/32" X 3/32" X .031	.157	+/- .005	+/- .003	238 (16.4)	1,197 (82.6)
3/16"	103-0188031-XXXXXX	3/16" X 1/8" X .031	.188	+/- .005	+/- .003	199 (13.7)	1,002 (69.1)
1/4"	103-0250031-XXXXXX	1/4" X 3/16" X .031	.250	+/- .005	+/- .003	150 (10.3)	756 (52.1)
5/16"	103-0312031-XXXXXX	5/16" X 1/4" X .031	.312	+/- .005	+/- .003	120 (8.3)	606 (41.8)
3/8"	103-0375031-XXXXXX	3/8" X 5/16" X .031	.375	+/- .005	+/- .003	100 (6.9)	506 (34.9)
7/16"	103-0438031-XXXXXX	7/16" X 3/8" X .031	.438	+/- .005	+/- .003	86 (5.9)	435 (30.0)
1/2"	103-0500031-XXXXXX	1/2" X 7/16" X .031	.500	+/- .006	+/- .003	75 (5.2)	381 (26.3)
9/16"	103-0563031-XXXXXX	9/16" X 1/2" X .031	.563	+/- .006	+/- .003	67 (4.6)	339 (23.4)
5/8"	103-0625031-XXXXXX	5/8" X 9/16" X .031	.625	+/- .006	+/- .003	60 (4.1)	305 (21.0)
11/16"	103-0688031-XXXXXX	11/16" X 5/8" X .031	.688	+/- .006	+/- .003	55 (3.8)	278 (19.1)
3/4"	103-0750032-XXXXXX	3/4" X 11/16" X .032	.750	+/- .006	+/- .003	54 (3.7)	255 (17.6)
.830	103-0830040-XXXXXX	.830 X 3/4" X .040	.830	+/- .006	+/- .003	61 (4.2)	305 (21.0)
.965	103-0965045-XXXXXX	.965 X 7/8" X .045	.965	+/- .007	+/- .003	59 (4.0)	295 (20.4)
1.10	103-1100050-XXXXXX	1.10 X 1" X .050	1.100	+/- .010	+/- .004	47 (3.2)	235 (16.2)
1.205	103-1205040-XXXXXX	1.205 X 1-1/8" X .040	1.205	+/- .015	+/- .004	42 (2.9)	211 (14.5)
1.330	103-1330040-XXXXXX	1.330 X 1-1/4" X .040	1.330	+/- .015	+/- .004	38 (2.6)	191 (13.2)

### Heavy Wall Fractional Size Tubing

OD	Part Number	OD X ID X Wall	Nominal OD	OD Tolerance	Wall Tolerance	Working PSIG (bar)	Burst PSIG (bar)
3/16"	103-0188062-XXXXXX	3/16" X 1/16" X .062	.188	+/- .005	+/- .003	393 (27.1)	1,983 (136.7)
1/4"	103-0250047-XXXXXX 103-0250062-XXXXXX	1/4" X 5/32" X .047 1/4" X 1/8" X .062	.250	+/- .005	+/- .003	229 (15.8) 300 (20.7)	1,154 (79.6) 1,511 (104.2)
5/16"	103-0312062-XXXXXX	5/16" X 3/16" X .062	.312	+/- .005	+/- .003	242 (16.7)	1,220 (84.1)
3/8"	103-0375062-XXXXXX	3/8" X 1/4" X .062	.375	+/- .005	+/- .003	210 (14.5)	1,024 (70.6)
7/16"	103-0438062-XXXXXX	7/16" X 5/16" X .062	.438	+/- .005	+/- .003	175 (12.1)	882 (60.8)
1/2"	103-0500062-XXXXXX	1/2" X 3/8" X .062	.500	+/- .005	+/- .003	160 (11.0)	774 (53.4)
9/16"	103-0563062-XXXXXX	9/16" X 7/16" X .062	.563	+/- .006	+/- .003	137 (9.4)	690 (47.6)
5/8"	103-0625062-XXXXXX	5/8" X 1/2" X .062	.625	+/- .006	+/- .003	125 (8.6)	622 (42.9)
11/16"	103-0688062-XXXXXX	11/16" X 9/16" X .062	.688	+/- .006	+/- .003	112 (7.8)	567 (39.1)
3/4"	103-0750062-XXXXXX	3/4" X 5/8" X .062	.750	+/- .006	+/- .003	105 (7.2)	520 (35.9)
7/8"	103-0875062-XXXXXX	7/8" X 3/4" X .062	.875	+/- .007	+/- .003	90 (6.2)	447 (30.8)
1"	103-1000062-XXXXXX	1" X 7/8" X .062	1.000	+/- .010	+/- .003	80 (5.5)	392 (27.0)
1-1/8"	103-1125062-XXXXXX	1-1/8" X 1" X .062	1.125	+/- .015	+/- .003	69 (4.8)	349 (24.0)
1-1/4"	103-1250062-XXXXXX	1-1/4" X 1-1/8" X .062	1.250	+/- .015	+/- .004	62 (4.3)	314 (21.7)
1-3/8"	103-1375062-XXXXXX	1-3/8" X 1-1/4" X .062	1.375	+/- .015	+/- .004	57 (3.9)	286 (19.7)
2-1/8"	103-2125062-XXXXXX	2-1/8" X 2" X .062	2.125	+/- .015	+/- .004	37 (2.5)	186 (12.8)

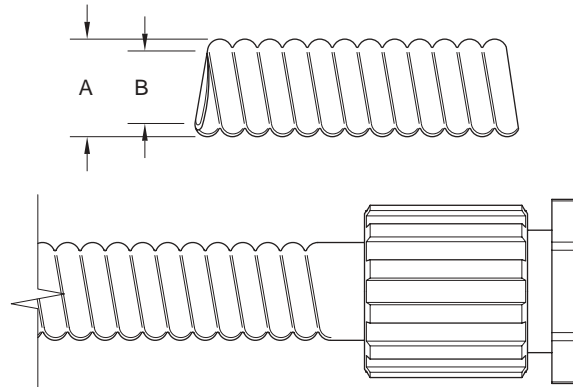
Pressures above are for operation at 73°F. Working pressure calculated using a Safety Factor of 5. Note other manufacturers may use a Safety Factor of 4. Fractional tubing is supplied in 25 ft. increments up to 1000 ft. continuous for sizes up to 1" OD. Consult factory for standard packaging on sizes greater than 1" OD. Custom packaging and sizes are quoted upon request.

**Metric Tubing**

OD	Part Number	OD X ID mm	OD X ID Inch	OD / ID Tolerance mm	OD / ID Tolerance Inch
3	203-0300100-XXXXXX	3.0 X 1.0	.118 X .039	+/- .11	+/- .004
4	203-0400100-XXXXXX	4.0 X 2.0	.157 X .078	+/- .11	+/- .004
5	203-0500100-XXXXXX	5.0 X 3.0	.197 X .118	+/- .11	+/- .004
6	203-0600100-XXXXXX	6.0 X 4.0	.236 X .157	+/- .13	+/- .005
7	203-0700100-XXXXXX	7.0 X 5.0	.276 X .197	+/- .13	+/- .005
8	203-0800100-XXXXXX	8.0 X 6.0	.315 X .236	+/- .13	+/- .005
9	203-0900100-XXXXXX	9.0 X 7.0	.354 X .276	+/- .13	+/- .005
10	203-1000100-XXXXXX	10.0 X 8.0	.393 X .315	+/- .13	+/- .005
12	203-1200100-XXXXXX	12.0 X 10.0	.472 X .393	+/- .15	+/- .006
14	203-1400100-XXXXXX	14.0 X 12.0	.551 X .472	+/- .15	+/- .006
16	203-1600100-XXXXXX	16.0 X 14.0	.630 X .551	+/- .15	+/- .006

Consult factory for pressure ratings.

**Convolute Tubing**



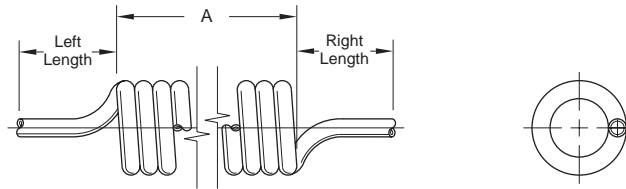
OPTION WITH FLARE NUT ASSEMBLY  
CONSULT FACTORY FOR PRICING

Part Number	OD "A" X ID "B"	Nominal Wall	Bend Radius	Pitch
303-0375020-XXXXXX	3/8" X 1/4"	.020	1/2"	8
303-0500023-XXXXXX	1/2" X 3/8"	.023	3/4"	8
303-0750025-XXXXXX	3/4" X 5/8"	.025	1-1/2"	8
303-1000025-XXXXXX	1" X 7/8"	.025	2-1/2"	8

Convolute tubing is used in applications where smaller bend diameters are required. Convolute tubing is made to order. Custom sizes, colors, packaging, and PTFE liners are quoted upon request.



## Retractable Coils



Part Number	OD X ID	Coil ID Inch (mm)	Retracted Length "A" Inch (mm)	Extended Length Inch (mm)
703-0188062-XX0003	3/16" X 1/16"	.750 (19.1)	3 (76)	12 (305)
703-0188062-XX0006	3/16" X 1/16"	.750 (19.1)	6 (152)	24 (610)
703-0188062-XX0012	3/16" X 1/16"	.750 (19.1)	12 (305)	48 (1219)
703-0188062-XX0018	3/16" X 1/16"	.750 (19.1)	18 (457)	72 (1829)
703-0250062-XX0003	1/4" X 1/8"	1.00 (25.4)	3 (76)	12 (305)
703-0250062-XX0006	1/4" X 1/8"	1.00 (25.4)	6 (152)	24 (610)
703-0250062-XX0012	1/4" X 1/8"	1.00 (25.4)	12 (305)	48 (1219)
703-0250062-XX0018	1/4" X 1/8"	1.00 (25.4)	18 (457)	72 (1829)
703-0312062-XX0003	5/16" X 3/16"	1.625 (41.3)	3 (76)	12 (305)
703-0312062-XX0006	5/16" X 3/16"	1.625 (41.3)	6 (152)	24 (610)
703-0312062-XX0012	5/16" X 3/16"	1.625 (41.3)	12 (305)	48 (1219)
703-0312062-XX0018	5/16" X 3/16"	1.625 (41.3)	18 (457)	72 (1829)
703-0375062-XX0003	3/8" X 1/4"	1.625 (41.3)	3 (76)	12 (305)
703-0375062-XX0006	3/8" X 1/4"	1.625 (41.3)	6 (152)	24 (610)
703-0375062-XX0012	3/8" X 1/4"	1.625 (41.3)	12 (305)	48 (1219)
703-0375062-XX0015	3/8" X 1/4"	1.625 (41.3)	15 (381)	60 (1524)
703-0375062-XX0018	3/8" X 1/4"	1.625 (41.3)	18 (457)	72 (1829)
703-0438062-XX0003	7/16" X 5/16"	3.00 (76.2)	3 (76)	12 (305)
703-0438062-XX0006	7/16" X 5/16"	3.00 (76.2)	6 (152)	24 (610)
703-0438062-XX0012	7/16" X 5/16"	3.00 (76.2)	12 (305)	48 (1219)
703-0500062-XX0003	1/2" X 3/8"	3.00 (76.2)	3 (76)	12 (305)
703-0500062-XX0006	1/2" X 3/8"	3.00 (76.2)	6 (152)	24 (610)
703-0500062-XX0012	1/2" X 3/8"	3.00 (76.2)	12 (305)	48 (1219)

Standard left/right tail length is 6 inches. Please consult factory for special coil lengths and/or ID's.

## Schedule 40 Pipe

Part Number	Nominal Inch Size	Actual OD Inch	Minimum Wall Inch	OD Tolerance Inch	Wall Tolerance Inch
503-0540088-XXXXXX	1/4"	.540	.088	+/- .010	+ .020 / -.00
503-0840109-XXXXXX	1/2"	.840	.109	+/- .010	+ .020 / -.00
503-1050113-XXXXXX	3/4"	1.050	.113	+/- .010	+ .020 / -.00
503-1315133-XXXXXX	1"	1.315	.133	+/- .015	+ .020 / -.00
503-2375154-XXXXXX	2"	2.375	.154	+/- .015	+ .020 / -.00

Pipe is supplied in 5 and 10 foot straights (i.e. 503-0540088-**N50010**). Custom packaging, lengths, and schedule 80 pipe are quoted upon request.

## Product Overview:

Parflex/Atlantic's line of PTFE (Polytetrafluoroethylene) tubing is the most flexible product offered. PTFE tubing resists corrosive liquids and gases, and has the broadest temperature range of all Fluoropolymer products. The tubing has a smooth non-stick surface with low permeability.

### Features:

100% virgin PTFE resin used on all products.

Most flexible Fluoropolymer available.

Chemically inert to nearly all industrial chemicals and solvents.

Smooth nonstick surface resulting in the lowest coefficient of friction.

Low permeability.

Nonflammable materials.

FDA Compliant.

Excellent electrical properties.

### Benefits:

Highest quality products.

Longer lasting.

Longer product life and less downtime.

Higher abrasion resistance with no process contamination.

Useful in severe chemical and gas service.

Safety.

Useful in food applications.

Useful in insulation applications.

### Specifications:

#### Materials:

PTFE Products in this catalog are manufactured using resins complying with ASTM D 3295 Specification.

#### Flammability:

Listed VW-1 by the Underwriters' Laboratories, Inc. in their burning test classification for polymeric materials and passes the UL 83 vertical flame test. In a flame situation, PTFE tubing resists combustion and does not promote flame spread.

#### FDA Compliance:

All PTFE resins qualify for use in contact with food in compliance with FDA regulation 21 CFR 177.1550.

#### Temperature Ranges:

-410° - 500° F (-246° -260° C) More pressure temperature information is available from the factory upon request.

<i>Tubing Size OD X ID X Wall</i>	<i>Minimum Bend Radius</i>
1/8" X 1/16" X .031	1/2"
1/4" X 1/8" X .062	1/2"
1/4" X 5/32" X .047	3/4"
1/4" X 3/16" X .031	1"
5/16" X 3/16" X .062	1/2"
5/16" X 1/4" X .031	1-3/4"
3/8" X 1/4" X .062	3/4"
3/8" X 5/16" X .031	2-1/2"
1/2" X 3/8" X .062	2-1/2"
1/2" X 7/16" X .031	4"
5/8" X 1/2" X .062	3"
5/8" X 9/16" X .031	12"
3/4" X 5/8" X .062	6"
3/4" X 11/16" X .032	16"
7/8" X 3/4" X .062	12"
1" X 7/8" X .062	16"

Part numbers below are for standard configurations. For complete part numbers and options for material, color, packaging, etc. refer to Part Number Matrix on page 4.

### Industrial Wall Fractional Size Tubing

OD	Part Number	OD X ID X Wall	Nominal OD	OD Tolerance	Wall Tolerance	Working PSIG (bar)	Burst PSIG (bar)
3/32"	101-0094031-XXXXXX	3/32" X 1/32" X .031	.094	+/- .004	+/- .003	389 (26.8)	1,962 (135.3)
1/8"	101-0125031-XXXXXX	1/8" X 1/16" X .031	.125	+/- .004	+/- .003	295 (20.3)	1,487 (102.5)
5/32"	101-0156031-XXXXXX	5/32" X 3/32" X .031	.157	+/- .005	+/- .003	238 (16.4)	1,197 (82.6)
3/16"	101-0188031-XXXXXX	3/16" X 1/8" X .031	.188	+/- .005	+/- .003	199 (13.7)	1,002 (69.1)
1/4"	101-0250031-XXXXXX	1/4" X 3/16" X .031	.250	+/- .005	+/- .003	150 (10.3)	756 (52.1)
5/16"	101-0312031-XXXXXX	5/16" X 1/4" X .031	.312	+/- .005	+/- .003	120 (8.3)	606 (41.8)
3/8"	101-0375031-XXXXXX	3/8" X 5/16" X .031	.375	+/- .005	+/- .003	100 (6.9)	506 (34.9)
7/16"	101-0438031-XXXXXX	7/16" X 3/8" X .031	.438	+/- .005	+/- .003	86 (5.9)	435 (30.0)
1/2"	101-0500031-XXXXXX	1/2" X 7/16" X .031	.500	+/- .006	+/- .003	75 (5.2)	381 (26.3)
9/16"	101-0563031-XXXXXX	9/16" X 1/2" X .031	.563	+/- .006	+/- .003	67 (4.6)	339 (23.4)
5/8"	101-0625031-XXXXXX	5/8" X 9/16" X .031	.625	+/- .006	+/- .003	60 (4.1)	305 (21.0)
11/16"	101-0688031-XXXXXX	11/16" X 5/8" X .031	.688	+/- .006	+/- .003	55 (3.8)	278 (19.1)
3/4"	101-0750032-XXXXXX	3/4" X 11/16" X .032	.750	+/- .006	+/- .003	50 (3.4)	255 (17.6)
.830	101-0830040-XXXXXX	.830 X 3/4" X .040	.830	+/- .006	+/- .003	61 (4.2)	305 (21.7)
.965	101-0965045-XXXXXX	.965 X 7/8" X .045	.965	+/- .007	+/- .003	59 (4.0)	295 (20.4)
1.10	101-1100050-XXXXXX	1.10 X 1" X .050	1.100	+/- .010	+/- .004	47 (3.2)	235 (16.7)
1.205	101-1205040-XXXXXX	1.205 X 1-1/8" X .040	1.205	+/- .015	+/- .004	42 (2.9)	211 (15.0)
1.330	101-1330040-XXXXXX	1.330 X 1-1/4" X .040	1.330	+/- .015	+/- .004	38 (2.6)	191 (13.2)
1.580	101-1580040-XXXXXX	1.580 X 1-1/2" X .040	1.580	+/- .015	+/- .004	32 (2.2)	161 (11.1)

### Heavy Wall Fractional Size Tubing

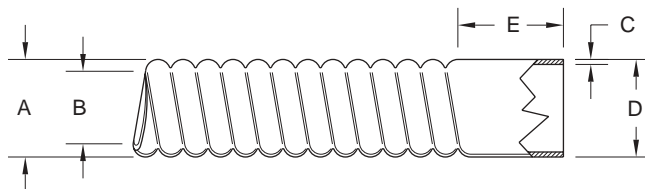
OD	Part Number	OD X ID X Wall	Nominal OD	OD Tolerance	Wall Tolerance	Working PSIG (bar)	Burst PSIG (bar)
3/16"	101-0188062-XXXXXX	3/16" X 1/16" X .062	.188	+/- .005	+/- .003	393 (27.1)	1,983 (136.7)
1/4"	101-0250047-XXXXXX 101-0250062-XXXXXX	1/4" X 5/32" X .047 1/4" X 1/8" X .062	.250	+/- .005	+/- .003	229 (15.8) 300 (20.7)	1,154 (79.6) 1,511 (104.2)
5/16"	101-0312062-XXXXXX	5/16" X 3/16" X .062	.312	+/- .005	+/- .003	242 (16.7)	1,220 (84.1)
3/8"	101-0375062-XXXXXX	3/8" X 1/4" X .062	.375	+/- .005	+/- .003	200 (13.8)	1,024 (70.6)
7/16"	101-0438062-XXXXXX	7/16" X 5/16" X .062	.438	+/- .005	+/- .003	175 (12.1)	882 (60.8)
1/2"	101-0500062-XXXXXX	1/2" X 3/8" X .062	.500	+/- .005	+/- .003	150 (10.3)	774 (53.4)
9/16"	101-0563062-XXXXXX	9/16" X 7/16" X .062	.563	+/- .006	+/- .003	137 (9.4)	690 (47.6)
5/8"	101-0625062-XXXXXX	5/8" X 1/2" X .062	.625	+/- .006	+/- .003	125 (8.6)	622 (42.9)
11/16"	101-0688062-XXXXXX	11/16" X 9/16" X .062	.688	+/- .006	+/- .003	112 (7.8)	567 (39.1)
3/4"	101-0750062-XXXXXX	3/4" X 5/8" X .062	.750	+/- .006	+/- .003	100 (6.9)	520 (35.9)
7/8"	101-0875062-XXXXXX	7/8" X 3/4" X .062	.875	+/- .007	+/- .003	90 (6.2)	447 (30.8)
1"	101-1000062-XXXXXX	1" X 7/8" X .062	1.000	+/- .010	+/- .003	80 (5.5)	392 (27.0)

Pressures above are for operation at 73°F. Working pressure calculated using a Safety Factor of 5. Note other manufacturers may use a Safety Factor of 4. Fractional tubing for sizes up to 1" OD is supplied in random length coils with a minimum coil length of 15 feet and a maximum of 3 pieces per 100 feet. Sizes over 1" OD are supplied in 5 or 10 foot straights. Custom packaging and sizes are quoted upon request.

**Metric Size Tubing**

OD	Part Number	OD X ID mm	OD X ID Inch	OD / ID Tolerance mm	OD / ID Tolerance Inch
3	203-0300100-XXXXXX	3.0 X 1.0	.118 X .039	+/- .11	+/- .004
4	203-0400100-XXXXXX	4.0 X 2.0	.157 X .078	+/- .11	+/- .004
5	203-0500100-XXXXXX	5.0 X 3.0	.197 X .118	+/- .11	+/- .004
6	203-0600100-XXXXXX	6.0 X 4.0	.236 X .157	+/- .13	+/- .005
7	203-0700100-XXXXXX	7.0 X 5.0	.276 X .197	+/- .13	+/- .005
8	203-0800100-XXXXXX	8.0 X 6.0	.315 X .236	+/- .13	+/- .005
9	203-0900100-XXXXXX	9.0 X 7.0	.354 X .276	+/- .13	+/- .005
10	203-1000100-XXXXXX	10.0 X 8.0	.393 X .315	+/- .13	+/- .005
12	203-1200100-XXXXXX	12.0 X 10.0	.472 X .393	+/- .15	+/- .006
14	203-1400100-XXXXXX	14.0 X 12.0	.551 X .472	+/- .15	+/- .006
16	203-1600100-XXXXXX	16.0 X 14.0	.630 X .551	+/- .15	+/- .006

Consult factory for pressure ratings.

**Convolute Tubing**

Part Number	OD "A" X ID "B"	Wall "C"	Cuff OD "D"	Cuff Length "E"	Bend Radius	Pitch
301-0320023-XXXXXX	.320 X .181	.023	.280	3/4"	1/2"	8
301-0450027-XXXXXX	.450 X .303	.027	.415	1"	7/8"	7
301-0590027-XXXXXX	.590 X .425	.027	.540	1"	1-1/4"	6
301-0660029-XXXXXX	.660 X .485	.029	.673	1-1/4"	1-1/2"	6
301-0780035-XXXXXX	.780 X .608	.035	.800	1-1/2"	1-3/4"	6
301-1100035-XXXXXX	1.100 X .850	.035	1.060	2"	2-1/4"	4-1/2
301-1390035-XXXXXX	1.390 X 1.105	.035	1.310	2-1/2"	2-3/4"	4
301-1539035-XXXXXX	1.539 X 1.210	.035	1.560	2-1/2"	3"	4
301-2100040-XXXXXX	2.100 X 1.690	.040	2.080	2-1/2"	3"	4

Convolute tubing is made to order. Custom packaging, sizes, and colors are quoted upon request. Additional charges may apply for custom cuffs. Stock packaging is random coils.

**Specifications:** MIL-T-81914/1; additional sizes including /2, Class 1 & 2 also available.

**Product Overview:**

PVDF (Polyvinylidene Fluoride) is a tough engineering Fluoropolymer that offers a combination of properties beneficial for use in many critical applications requiring chemical resistance with low permeability. PVDF exhibits low extractable levels, while providing high mechanical strength, excellent abrasion resistance, and good resistance to many chemicals and solvents. Atlantic's PVDF tubing is excellent for use in ultra pure water systems and for ground water monitoring.

**Features:**

- 100% virgin PVDF resin used on all products.**
- Good chemical resistance.**
- Low permeability.**
- Weather resistant.**
- UV and radiation resistance.**
- High abrasion resistance and thermal stability.**
- FDA Compliant.**

**Benefits:**

- No process contamination.**
- Useful in most applications with long cycle life.**
- Useful in severe chemical and gas applications.**
- Excellent for outdoor use under extreme conditions.**
- Useful in severe applications.**
- Useful in thermal cycling applications.**
- Useful in food applications.**

**Specifications:**

- Materials:**  
Products in this catalog are manufactured using resins complying with ASTM D 3222 Specification.
- Flammability:**  
Listed 94-VO rated by the Underwriters' Laboratories, Inc. in their burning test classification for polymeric materials and passes the UL 83 vertical flame test. In a flame situation, PVDF tubing resists combustion and does not promote flame spread.
- FDA Compliance:**  
Most PVDF resins qualify for use in contact with food in compliance with FDA regulation 21 CFR 177.1500.
- Temperature Ranges:**  
-20° - 250° F (-29° -121° C) More pressure temperature information is available from the factory upon request.

<i>Tubing Size OD X ID X Wall</i>	<i>Minimum Bend Radius</i>
1/8" X 1/16" X .031	1/2"
1/4" X 1/8" X .062	1/2"
1/4" X 5/32" X .047	3/4"
1/4" X 3/16" X .031	1"
5/16" X 3/16" X .062	1/2"
5/16" X 1/4" X .031	1-3/4"
3/8" X 1/4" X .062	3/4"
3/8" X 5/16" X .031	2-1/2"
1/2" X 3/8" X .062	2-1/2"
1/2" X 7/16" X .031	4"
5/8" X 1/2" X .062	3"
3/4" X 5/8" X .062	6"
3/4" X 11/16" X .032	16"
1" X 7/8" X .062	16"

Part numbers below are for standard configurations. For complete part numbers and options for material, color, packaging, etc. refer to Part Number Matrix on page 4.

**Industrial Wall Fractional Tubing**

OD	Part Number	OD X ID X Wall	Nominal OD	OD Tolerance	Wall Tolerance	Working PSIG (bar)	Burst PSIG (bar)
1/8"	110-0125031-XXXXXX	1/8" X 1/16" X .031	.125	+/- .004	+/- .003	267 (18.4)	1,348 (92.9)
3/16"	110-0188031-XXXXXX	3/16" X 1/8" X .031	.188	+/- .005	+/- .003	180 (12.4)	908 (62.6)
1/4"	110-0250031-XXXXXX	1/4" X 3/16" X .031	.250	+/- .005	+/- .003	170 (11.7)	685 (47.2)
5/16"	110-0312031-XXXXXX	5/16" X 1/4" X .031	.312	+/- .005	+/- .003	109 (7.5)	550 (37.9)
3/8"	110-0375031-XXXXXX	3/8" X 5/16" X .031	.375	+/- .005	+/- .003	111 (7.6)	459 (31.6)
7/16"	110-0438031-XXXXXX	7/16" X 3/8" X .031	.438	+/- .005	+/- .003	78 (5.4)	394 (27.2)
1/2"	110-0500031-XXXXXX	1/2" X 7/16" X .031	.500	+/- .006	+/- .003	83 (5.7)	345 (23.8)
9/16"	110-0563031-XXXXXX	9/16" X 1/2" X .031	.563	+/- .006	+/- .003	61 (4.2)	307 (21.2)

**Heavy Wall Fractional Tubing**

OD	Part Number	OD X ID X Wall	Nominal OD	OD Tolerance	Wall Tolerance	Working PSIG (bar)	Burst PSIG (bar)
1/4"	110-0250047-XXXXXX	1/4" X 5/32" X .047	.250	+/- .005	+/- .003	208 (14.3)	1,046 (72.1)
	110-0250062-XXXXXX	1/4" X 1/8" X .062				330 (22.7)	1,369 (94.4)
5/16"	110-0312062-XXXXXX	5/16" X 3/16" X .062	.312	+/- .005	+/- .003	219 (15.1)	1,106 (76.3)
3/8"	110-0375062-XXXXXX	3/8" X 1/4" X .062	.375	+/- .005	+/- .003	224 (15.4)	928 (64.0)
1/2"	110-0500062-XXXXXX	1/2" X 3/8" X .062	.500	+/- .005	+/- .003	169 (11.7)	701 (48.3)
5/8"	110-0625062-XXXXXX	5/8" X 1/2" X .062	.625	+/- .006	+/- .003	136 (9.4)	564 (38.9)
3/4"	110-0750062-XXXXXX	3/4" X 5/8" X .062	.750	+/- .006	+/- .003	114 (7.9)	472 (32.5)
1"	110-1000062-XXXXXX	1" X 7/8" X .062	1.000	+/- .010	+/- .003	86 (5.9)	355 (24.5)
1-1/8"	110-1125062-XXXXXX	1-1/8" X 1" X .062	1.125	+/- .015	+/- .003	63 (4.3)	316 (21.8)

Pressures above are for operation at 73°F. Working pressure calculated using a Safety Factor of 5. Note other manufacturers may use a Safety Factor of 4. Fractional tubing is supplied in 25 ft. increments up to 1000 ft. continuous for sizes up to 1" OD. Consult factory for standard packaging on sizes greater than 1" OD. Custom packaging and sizes are quoted upon request.

**Metric Tubing**

OD	Part Number	OD X ID mm	OD X ID Inch	OD / ID Tolerance mm	OD / ID Tolerance Inch
3	210-0300100-XXXXXX	3.0 X 1.0	.118 X .039	+/- .11	+/- .004
4	210-0400100-XXXXXX	4.0 X 2.0	.157 X .078	+/- .11	+/- .004
5	210-0500100-XXXXXX	5.0 X 3.0	.197 X .118	+/- .11	+/- .004
6	210-0600100-XXXXXX	6.0 X 4.0	.236 X .157	+/- .13	+/- .005
7	210-0700100-XXXXXX	7.0 X 5.0	.276 X .197	+/- .13	+/- .005
8	210-0800100-XXXXXX	8.0 X 6.0	.315 X .236	+/- .13	+/- .005
9	210-0900100-XXXXXX	9.0 X 7.0	.354 X .276	+/- .13	+/- .005
10	210-1000100-XXXXXX	10.0 X 8.0	.393 X .315	+/- .13	+/- .005
12	210-1200100-XXXXXX	12.0 X 10.0	.472 X .393	+/- .15	+/- .006
14	210-1400100-XXXXXX	14.0 X 12.0	.551 X .472	+/- .15	+/- .006

**Schedule 40 Pipe**

Part Number	Nominal Inch Size	Actual OD Inch	Minimum Wall Inch	OD Tolerance Inch	Wall Tolerance Inch
510-0540088-XXXXXX	1/4"	.540	.088	+/- .010	+ .020 / -.00
510-0840109-XXXXXX	1/2"	.840	.109	+/- .010	+ .020 / -.00
510-1050113-XXXXXX	3/4"	1.050	.113	+/- .010	+ .020 / -.00
510-1315133-XXXXXX	1"	1.315	.133	+/- .015	+ .020 / -.00
510-2375154-XXXXXX	2"	2.375	.154	+/- .015	+ .020 / -.00

Pipe is supplied in 5 and 10 foot straights (i.e. 510-0540088-**N50010**). Custom packaging, lengths, and schedule 80 pipe are quoted upon request.



**Product Overview:**

Fluoropolymer spaghetti tubing is ideal for insulation sleeving applications that require high temperature resistance (withstands soldering), chemical and abrasion resistance, and UL or CSA recognition. Standard sizes are manufactured in natural and ten colors (per MIL-STD-104). All colors require minimum run quantities. Precision cutting is available at a minimum charge. High speed rotary equipment yields excellent cut length tolerances with clean, square ends. PTFE cut pieces can be used as spacers, insulation for wire leads, or a protective outer layer in harsh chemical environments.

**PTFE Fractional Spaghetti Tubing**

Size (inch)	Nom ID	Standard Wall		Thin Wall		Light Wall		Standard Packaging
		Part Number	Nom Wall	Part Number	Nom Wall	Part Number	Nom Wall	
1/8"	.125	TFS 1/8	.020	TFT 1/8	.015	TFL 1/8	.008	Random length coil
3/16"	.188	TFS 3/16	.020	TFT 3/16	.015	TFL 3/16	.010	Random length coil
1/4"	.255	TFS 1/4	.020	TFT 1/4	.015	TFL 1/4	.010	Random length coil
5/16"	.318	TFS 5/16	.020	TFT 5/16	.015	TFL 5/16	.012	Random length coil
3/8"	.381	TFS 3/8	.025	TFT 3/8	.020	TFL 3/8	.015	Random length coil
7/16"	.444	TFS 7/16	.025	TFT 7/16	.020	TFL 7/16	.018	Random length coil
1/2"	.507	TFS 1/2	.025	TFT 1/2	.020	TFL 1/2	.018	Random length coil
5/8"	.632	TFS 5/8	.030	TFT 5/8	.025			Random length coil
3/4"	.760	TFS 3/4	.035	TFT 3/4	.030			Random length coil
7/8"	.885	TFS 7/8	.035					Random length coil
1"	1.010	TFS 100	.035					Straight 5' & 10' Length

Fractional spaghetti tubing except for 1" is supplied in random length coils, with a minimum coil length of 15 feet. 1" size is supplied in 5 or 10 foot straight lengths. Custom packaging, sizes, and lengths are quoted upon request.

**Specifications:**

Standard Wall - ASTM D 3295, Class C, AMS 3653

Thin Wall - ASTM D 3295, Class B, AMS 3655

Light Wall - ASTM D 3295, Class A, AMS 3654



**PTFE AWG Spaghetti Tubing**

Size (AWG)	Nom ID	Min ID	Max ID	Heavy Wall		Stand Wall		Thin Wall		Light Wall		Standard Packaging
				Part No	Nom Wall	Part No	Nom Wall	Part No	Nom Wall	Part No	Nom Wall	
32	.010							TFT 32	.007 ±.002	TFL 32	.005 ±.002	1,000 ft. spool
30	.012	.010	.015			TFS 30	.009 ±.002	TFT 30	.009 ±.002	TFL 30	.006 ±.002	1,000 ft. spool
28	.015	.013	.018			TFS 28	.009 ±.002	TFT 28	.009 ±.002	TFL 28	.006 ±.002	1,000 ft. spool
26	.018	.016	.031			TFS 26	.009 ±.002	TFT 26	.009 ±.002	TFL 26	.006 ±.002	1,000 ft. spool
24	.022	.020	.026	TFH 24	.016 ±.003	TFS 24	.012 ±.003	TFT 24	.010 ±.003	TFL 24	.006 ±.002	1,000 ft. spool
23	.026	.023	.029	TFH 23	.016 ±.003	TFS 23	.012 ±.003	TFT 23	.010 ±.003	TFL 23	.006 ±.002	1,000 ft. spool
22	.028	.025	.032	TFH 22	.016 ±.003	TFS 22	.012 ±.003	TFT 22	.010 ±.003	TFL 22	.006 ±.002	1,000 ft. spool
21	.032	.029	.035			TFS 21	.012 ±.003	TFT 21	.010 ±.003	TFL 21	.006 ±.002	1,000 ft. spool
20	.034	.032	.040	TFH 20	.018 ±.003	TFS 20	.016 ±.003	TFT 20	.012 ±.003	TFL 20	.006 ±.002	1,000 ft. spool
19	.038	.036	.044	TFH 19	.020 ±.004	TFS 19	.016 ±.003	TFT 19	.012 ±.003	TFL 19	.006 ±.002	1,000 ft. spool
18	.042	.040	.049	TFH 18	.020 ±.004	TFS 18	.016 ±.003	TFT 18	.012 ±.003	TFL 18	.006 ±.002	1,000 ft. spool
17	.048	.045	.054	TFH 17	.020 ±.004	TFS 17	.016 ±.003	TFT 17	.012 ±.003	TFL 17	.006 ±.002	1,000 ft. spool
16	.053	.051	.061	TFH 16	.020 ±.004	TFS 16	.016 ±.003	TFT 16	.012 ±.003	TFL 16	.006 ±.002	1,000 ft. spool
15	.059	.057	.067	TFH 15	.020 ±.004	TFS 15	.016 ±.003	TFT 15	.012 ±.003	TFL 15	.008 ±.002	1,000 ft. spool
14	.066	.064	.074	TFH 14	.020 ±.004	TFS 14	.016 ±.003	TFT 14	.012 ±.003	TFL 14	.008 ±.002	500 ft. spool
13	.076	.072	.082	TFH 13	.020 ±.004	TFS 13	.016 ±.003	TFT 13	.012 ±.003	TFL 13	.008 ±.002	500 ft. spool
12	.085	.081	.091	TFH 12	.020 ±.004	TFS 12	.016 ±.003	TFT 12	.012 ±.003	TFL 12	.008 ±.002	500 ft. spool
11	.095	.091	.101	TFH 11	.020 ±.004	TFS 11	.016 ±.003	TFT 11	.012 ±.003	TFL 11	.008 ±.002	500 ft. spool
10	.106	.102	.112	TFH 10	.025 ±.005	TFS 10	.016 ±.003	TFT 10	.012 ±.003	TFL 10	.008 ±.002	500 ft. spool
9	.118	.114	.124	TFH 9	.025 ±.005	TFS 9	.020 ±.004	TFT 9	.015 ±.003	TFL 9	.008 ±.002	500 ft. spool
8	.133	.129	.141	TFH 8	.030 ±.005	TFS 8	.020 ±.004	TFT 8	.015 ±.003	TFL 8	.008 ±.002	Random length coil
7	.148	.144	.158	TFH 7	.030 ±.005	TFS 7	.020 ±.004	TFT 7	.015 ±.003	TFL 7	.008 ±.002	Random length coil
6	.166	.162	.178	TFH 6	.030 ±.005	TFS 6	.020 ±.004	TFT 6	.015 ±.003	TFL 6	.010 ±.003	Random length coil
5	.185	.182	.198	TFH 5	.032 ±.005	TFS 5	.020 ±.004	TFT 5	.015 ±.003	TFL 5	.010 ±.003	Random length coil
4	.208	.204	.224			TFS 4	.020 ±.004	TFT 4	.015 ±.003	TFL 4	.010 ±.003	Random length coil
3	.234	.229	.249			TFS 3	.020 ±.004	TFT 3	.015 ±.003	TFL 3	.010 ±.003	Random length coil
2	.263	.258	.278			TFS 2	.020 ±.004	TFT 2	.015 ±.003	TFL 2	.010 ±.003	Random length coil
1	.294	.289	.311			TFS 1	.020 ±.004	TFT 1	.015 ±.003	TFL 1	.012 ±.003	Random length coil
0	.330	.325	.347			TFS 0	.020 ±.004	TFT 0	.015 ±.003	TFL 0	.012 ±.003	Random length coil

Spaghetti tubing is supplied in random lengths with a minimum length of 25 feet. Continuous lengths and colors quoted upon request. AWG spaghetti tubing is also available in FEP and PFA. Consult factory for pricing and minimum lengths.

**Specifications:**

Heavy Wall - ASTM D 3295, Class E

Standard Wall - ASTM D 3295, Class C, AMS 3653, MIL-I-22129, UL-224 600V 200°C, CSA 9032-01 600V

Thin Wall - ASTM D 3295, Class B, AMS 3655, UL-224 300V 200°C, CSA 9032-01 300V

Light Wall - ASTM D 3295, Class A, AMS 3654, UL-224 150V 200°C

**Product Overview:**

Fluoropolymer heat shrink products are excellent in corrosive environments. They are abrasive and shock resistant, flexible, and non-flammable. PTFE will withstand long term exposure to temperatures in excess of 500°F. PTFE heat shrink tubing is available in a 2:1 ratio, while FEP is available in a 1:3:1 ratio. Both products meet the industry standard MIL-I-23053B specification.

**PTFE Fractional Heat Shrink Tubing (2:1), Industrial Wall**

Size (inch)	MIL Spec*	Part Number	Minimum Expanded ID	Maximum Recovered ID	Nominal Recovered Wall	Wall Tolerance Recovered
1/8"	-101	HS2TFI 1/8	.166	.130	.030	± .005
3/16"	-102	HS2TFI 3/16	.250	.193	.030	± .005
1/4"	-103	HS2TFI 1/4	.333	.257	.030	± .005
5/16"	-104	HS2TFI 5/16	.415	.320	.030	± .005
3/8"	-105	HS2TFI 3/8	.498	.383	.030	± .005
7/16"	-106	HS2TFI 7/16	.580	.448	.030	± .006
1/2"	-107	HS2TFI 1/2	.666	.510	.030	± .006
9/16"	-108	HS2TFI 9/16	.748	.572	.030	± .006
5/8"	-109	HS2TFI 5/8	.830	.637	.030	± .006
11/16"	-110	HS2TFI 11/16	.915	.700	.032	± .006
3/4"	-111	HS2TFI 3/4	1.000	.764	.040	± .007
7/8"	-112	HS2TFI 7/8	1.170	.891	.045	± .007
1"	-113	HS2TFI 1.00	1.330	1.020	.050	± .008

Heat shrink tubing is available in stock packaging of 4 ft. straight lengths. 24 ft. is the minimum item quantity sold. Custom packaging, sizes, lengths, and colors are quoted upon request.

\*Specification: MIL-DTL-23053/12

**PTFE Fractional Heat Shrink Tubing (2:1)**

Size (AWG)	Min Expanded ID	Max Recovered ID	Standard Wall			Thin Wall			Light Wall		
			MIL Spec*	Part Number	Nom Recov Wall	MIL Spec*	Part Number	Nom Recov Wall	MIL Spec*	Part Number	Nom Recov Wall
1/8"	.215	.130	-215	HS2TFS 1/8	.020 ±.004	-319	HS2TFT 1/8	.015 ±.004	-415	HS2TFL 1/8	.010 ±.003
1/4"	.410	.260	-222	HS2TFS 1/4	.020 ±.004	-326	HS2TFT 1/4	.015 ±.004	-422	HS2TFL 1/4	.010 ±.003
5/16"	.470	.329	-225	HS2TFS 5/16	.020 ±.004	-329	HS2TFT 5/16	.015 ±.004	-425	HS2TFL 5/16	.010 ±.003
3/8"	.560	.399	-228	HS2TFS 3/8	.025 ±.006		HS2TFT 3/8	.015 ±.004			
7/16"	.655	.462	-229	HS2TFS 7/16	.025 ±.006		HS2TFT 7/16	.018 ±.004			
1/2"	.750	.524	-230	HS2TFS 1/2	.025 ±.006		HS2TFT 1/2	.018 ±.004			
5/8"	.930	.655	-231	HS2TFS 5/8	.030 ±.006		HS2TFT 5/8	.020 ±.004			
3/4"	1.125	.786	-232	HS2TFS 3/4	.035 ±.008		HS2TFT 3/4	.025 ±.004			
7/8"	1.130	.911	-233	HS2TF 7/8	.035 ±.008		HS2TFT 7/8	.025 ±.004			
1"	1.500	1.036	-234	HS2TFS 1.00	.035 ±.008		HS2TFT 1.00	.025 ±.004			

Heat shrink tubing is available in stock packaging of 4 ft. straight lengths. 24 ft. is the minimum item quantity sold. Custom packaging, sizes, lengths, and colors are quoted upon request.

\*Specification:

Standard Wall - MIL-DTL-23053/12, Class 2

Thin Wall - MIL-DTL-23053/12, Class 3

Light Wall - MIL-DTL-23053/12, Class 4

**PTFE AWG Heat Shrink Tubing (2:1)**

Size (AWG)	Min Expanded ID	Max Recovered ID	Standard Wall			Thin Wall			Light Wall		
			MIL Spec*	Part Number	Nom Recov Wall	MIL Spec*	Part Number	Nom Recov Wall	MIL Spec*	Part Number	Nom Recov Wall
30	.037	.015		HS2TFS 30	.009 ±.002	-301	HS2TFT 30	.009 ±.002		HS2TFL 30	.006 ±.002
28	.042	.018		HS2TFS 28	.009 ±.002	-302	HS2TFT 28	.009 ±.002		HS2TFL 28	.006 ±.002
26	.051	.022		HS2TFS 26	.009 ±.002	-303	HS2TFT 26	.009 ±.002		HS2TFL 26	.006 ±.002
24	.055	.027	-201	HS2TFS 24	.012 ±.002	-304	HS2TFT 24	.010 ±.003	-401	HS2TFL 24	.006 ±.002
22	.061	.032	-202	HS2TFS 22	.012 ±.002	-305	HS2TFT 22	.010 ±.003	-402	HS2TFL 22	.006 ±.002
20	.066	.039	-203	HS2TFS 20	.016 ±.003	-306	HS2TFT 20	.012 ±.003	-403	HS2TFL 20	.006 ±.002
19	.071	.043	-204	HS2TFS 19	.016 ±.003	-307	HS2TFT 19	.012 ±.003	-404	HS2TFL 19	.006 ±.002
18	.083	.049	-205	HS2TFS 18	.016 ±.003	-308	HS2TFT 18	.012 ±.003	-405	HS2TFL 18	.006 ±.002
17	.093	.054	-206	HS2TFS 17	.016 ±.003	-309	HS2TFT 17	.012 ±.003	-406	HS2TFL 17	.006 ±.002
16	.102	.061		HS2TFS 16	.016 ±.003	-310	HS2TFT 16	.012 ±.003	-407	HS2TFL 16	.006 ±.002
15	.121	.067	-207	HS2TFS 15	.016 ±.003	-311	HS2TF 15	.012 ±.003	-408	HS2TFL15	.006 ±.002
14	.132	.072	-208	HS2TFS 14	.016 ±.003	-312	HS2TFT 14	.012 ±.003	-409	HS2TFL 14	.008 ±.002
13	.154	.080	-210	HS2TFS 13	.016 ±.003	-313	HS2TFT 13	.012 ±.003	-410	HS2TFL 13	.008 ±.002
12	.165	.089	-211	HS2TFS 12	.016 ±.003	-314	HS2TFT 12	.012 ±.003	-411	HS2TFL 12	.008 ±.002
11	.187	.101	-212	HS2TFS 11	.016 ±.003	-316	HS2TFT 11	.012 ±.003	-412	HS2TFL 11	.008 ±.002
10	.210	.112	-213	HS2TFS 10	.016 ±.003	-317	HS2TFT 10	.015 ±.004	-413	HS2TFL 10	.008 ±.002
9	.225	.124	-214	HS2TFS 9	.020 ±.004	-318	HS2TFT 9	.015 ±.004	-414	HS2TFL 9	.008 ±.002
8	.264	.141	-216	HS2TFS 8	.020 ±.004	-320	HS2TFT 8	.015 ±.004	-416	HS2TFL 8	.008 ±.002
7	.284	.158	-217	HS2TFS 7	.020 ±.004	-321	HS2TFT 7	.015 ±.004	-417	HS2TFL 7	.010 ±.003
6	.317	.178	-218	HS2TFS 6	.020 ±.004	-322	HS2TFT 6	.015 ±.004	-418	HS2TFL 6	.010 ±.003
5	.336	.198	-219	HS2TFS 5	.020 ±.004	-323	HS2TFT 5	.015 ±.004	-419	HS2TFL 5	.010 ±.003
4	.389	.224	-220	HS2TFS 4	.020 ±.004	-324	HS2TFT 4	.015 ±.004	-420	HS2TFL 4	.010 ±.003
3	.410	.249	-221	HS2TFS 3	.020 ±.004	-325	HS2TFT 3	.015 ±.004	-421	HS2TFL 3	.010 ±.003
2	.452	.278	-223	HS2TFS 2	.020 ±.004	-327	HS2TFT 2	.015 ±.004	-423	HS2TFL 2	.010 ±.003
1	.473	.311	-224	HS2TFS 1	.020 ±.004	-328	HS2TFT 1	.015 ±.004	-424	HS2TFL 1	.010 ±.003
0	.494	.347	-226	HS2TFS 0	.020 ±.004	-330	HS2TFT 0	.015 ±.004	-426	HS2TFL 0	.012 ±.003

Heat shrink tubing is available in stock packaging of 4 ft. straight lengths. 100 ft. is the minimum item quantity sold. Custom packaging, sizes, lengths, and colors are quoted upon request.

**\*Specification:**

Standard Wall - MIL-DTL-23053/12, Class 2

Thin Wall - MIL-DTL-23053/12, Class 3

Light Wall - MIL-DTL-23053/12, Class 4

**FEP Fractional Heat Shrink Tubing (1.3:1)**

Size (inch)	MIL Spec*	Part Number	Minimum Expanded ID	Maximum Recovered ID	Nominal Recovered Wall	Wall Tolerance Recovered
3/8"	-119	HS1.3FEP 3/8	.500	.383	.015	± .004
7/16"	-120	HS1.3FEP 7/16	.580	.448	.020	± .004
1/2"	-121	HS1.3FEP 1/2	.666	.510	.020	± .004
5/8"	-122	HS1.3FEP 5/8	.830	.637	.025	± .004
3/4"	-123	HS1.3FEP 3/4	1.000	.764	.030	± .004
7/8"	-124	HS1.3FEP 7/8	1.170	.891	.035	± .004
1"	-126	HS1.3FEP 1.00	1.330	1.020	.035	± .004

Heat shrink tubing is supplied in 4 ft. straight lengths. 24 ft. is the minimum item quantity sold. Custom packaging, sizes, lengths, and colors are quoted upon request.

\*Specification: MIL-DTL-23053/11C, Class1

**FEP AWG Heat Shrink Tubing (1.3:1)**

Size (inch)	MIL Spec*	Part Number	Minimum Expanded ID	Maximum Recovered ID	Nominal Recovered Wall	Wall Tolerance Recovered
24	-101	HS1.3FEP 24	.031	.027	.008	± .002
22	-102	HS1.3FEP 22	.036	.032	.008	± .002
20	-103	HS1.3FEP 20	.045	.039	.008	± .002
18	-104	HS1.3FEP 18	.060	.049	.008	± .002
16	-105	HS1.3FEP 16	.075	.061	.009	± .002
14	-106	HS1.3FEP 14	.092	.072	.009	± .002
12	-107	HS1.3FEP 12	.115	.089	.009	± .002
10	-108	HS1.3FEP 10	.141	.112	.010	± .003
9	-109	HS1.3FEP 9	.158	.124	.010	± .003
8	-110	HS1.3FEP 8	.180	.143	.010	± .003
7	-111	HS1.3FEP 7	.197	.158	.011	± .004
6	-112	HS1.3FEP 6	.225	.180	.011	± .004
5	-113	HS1.3FEP 5	.248	.198	.011	± .004
4	-114	HS1.3FEP 4	.290	.226	.011	± .004
3	-115	HS1.3FEP 3	.310	.249	.011	± .004
2	-116	HS1.3FEP 2	.365	.280	.012	± .004
1	-117	HS1.3FEP 1	.400	.311	.012	± .004
0	-118	HS1.3FEP 0	.440	.349	.012	± .004

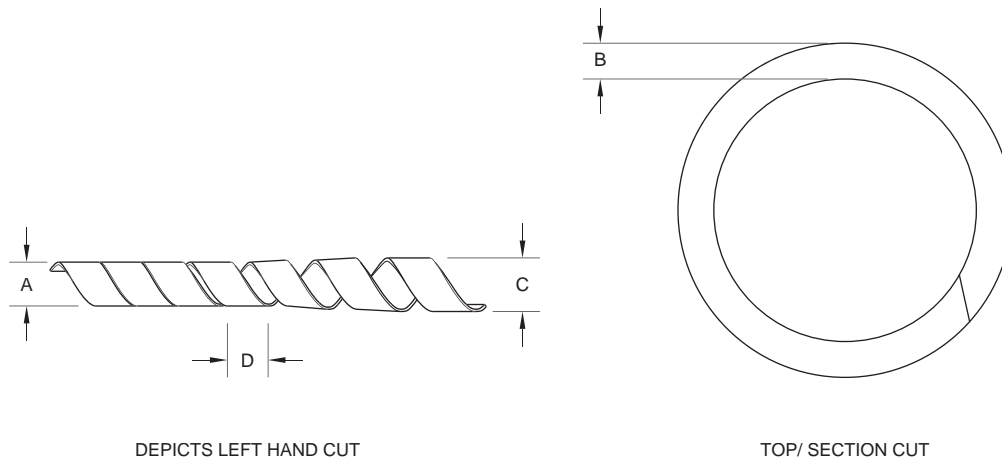
Heat shrink tubing is supplied in 4 ft. straight lengths. 100 ft. is the minimum item quantity sold. Custom packaging, sizes, lengths, and colors are quoted upon request.

\*Specification: MIL-DTL-23053/11C, Class1

**Product Overview:**

Fluoropolymer spiral cut cable wrap provides harnessing for wires and cable while allowing for leads at various points. Ideal applications include cable harnessing, wiring closets, station wiring, fibre optic cabling, aerospace and automotive end uses. This product has a “VO” flammability rating and is excellent for bundling cables in plenum areas. It is also durable, flexible and has outstanding electrical properties. Spiral wrap is offered in both left and right hand cut, and natural/ten colors, which allows for color coding and identification.

**PTFE Spiral Cut Cable Wrap**



Part Number	Size OD "A"	OD Tolerance	Wall "B"	Wall Tolerance	Pitch "D"	Pitch Tolerance	Max Bundle OD "C"
401-0125020-XXXXXX	.125	± .005	.020	± .008	.212	± .015	1/2"
401-0188030-XXXXXX	.188	± .005	.030	± .008	.312	± .015	1"
401-0250030-XXXXXX	.250	± .005	.030	± .008	.375	± .015	2"
401-0375030-XXXXXX	.375	± .005	.030	± .008	.437	± .015	2-1/2"
401-0500030-XXXXXX	.500	± .006	.030	± .008	.562	± .015	3"
401-0750030-XXXXXX	.750	± .007	.032	± .008	.875	± .015	4"
401-1000040-XXXXXX	1.00	± .010	.040	± .008	1.000	± .015	6"

Spiral cut cable wrap is supplied in non-continuous spools. Drawing above depicts a left hand spiral cut. Product is available in left or right hand cut. Please specify with proper suffix at end of part number. 100 ft. is the minimum item quantity sold. Custom packaging, sizes, and colors are available upon request. Spiral cut cable wrap is also quoted in FEP and ETFE upon request.

**Specification:** MIL-T-47287A, Type 1

**Product Overview:**

PTFE round beading/miniature rod is excellent as a filler in loose bundles of cables, as a pull cord, as o-ring seals, as a bonding agent (when melted), or cut into pieces as bearings and spacers. The smoother finish, greater flexibility, and longer lengths outperform “granular” extrusions.

**PTFE Round Beading/Miniature Rod**

<i>Part Number</i>	<i>Diameter</i>	<i>Tolerance</i>	<i>Standard Packaging</i>
TFB 015	.015	± .002	1,000 ft. spool
TFB 020	.020	± .002	1,000 ft. spool
TFB 025	.025	± .002	1,000 ft. spool
TFB 028	.028	± .002	1,000 ft. spool
TFB 031	.031	± .002	1,000 ft. spool
TFB 035	.035	± .002	1,000 ft. spool
TFB 039	.039	± .002	1,000 ft. spool
TFB 043	.043	± .002	1,000 ft. spool
TFB 047	.047	± .002	1,000 ft. spool
TFB 050	.050	± .002	1,000 ft. spool
TFB 055	.055	± .003	1,000 ft. spool
TFB 060	.060	± .003	1,000 ft. spool
TFB 062	.062	± .003	1,000 ft. spool
TFB 070	.070	± .003	1,000 ft. spool
TFB 072	.072	± .003	1,000 ft. spool
TFB 078	.078	± .004	500 ft. spool
TFB 080	.080	± .004	500 ft. spool
TFB 084	.084	± .004	500 ft. spool
TFB 090	.090	± .004	500 ft. spool
TFB 094	.094	± .004	500 ft. spool
TFB 100	.100	± .004	500 ft. spool
TFB 109	.109	± .004	500 ft. spool
TFB 115	.115	± .004	500 ft. spool
TFB 125	.125	± .004	500 ft. spool
TFB 150	.150	± .004	500 ft. spool
TFB 188	.188	± .004	Random length coil

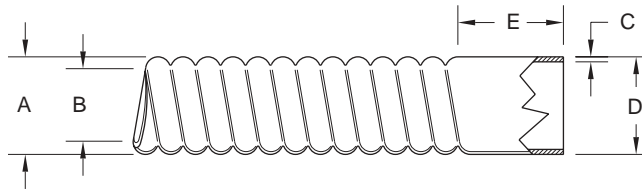
Round beading/miniature rod is supplied in non-continuous spool lengths as noted above. Custom packaging, sizes, and colors are quoted upon request.

ASTM D1710, Type 1, Grade 1, Class B

**Product Overview:**

PTFE convuluted tubing allows for insulation of wire bundles where sharp bends are required. Convuluted tubing is available in natural/ten colors and with cuffed ends to provide a sealed environment.

**PTFE Convuluted Tubing**

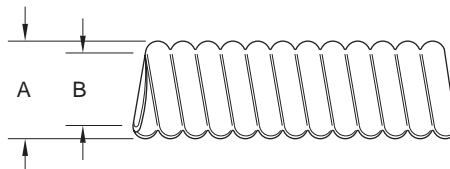


Part Number	OD "A" X ID "B"	Wall "C"	Cuff OD "D"	Cuff Length "E"	Bend Radius	Pitch
301-0320023-XXXXXX	.320 X .181	.023	.280	3/4"	1/2"	8
301-0450027-XXXXXX	.450 X .303	.027	.415	1"	7/8"	7
301-0590027-XXXXXX	.590 X .425	.027	.540	1"	1-1/4"	6
301-0660029-XXXXXX	.660 X .485	.029	.673	1-1/4"	1-1/2"	6
301-0780035-XXXXXX	.780 X .608	.035	.800	1-1/2"	1-3/4"	6
301-1100035-XXXXXX	1.100 X .850	.035	1.060	2"	2-1/4"	4-1/2
301-1390035-XXXXXX	1.390 X 1.105	.035	1.310	2-1/2"	2-3/4"	4
301-1539035-XXXXXX	1.539 X 1.210	.035	1.560	2-1/2"	3"	4
301-2100040-XXXXXX	2.100 X 1.690	.040	2.080	2-1/2"	3"	4

Convuluted tubing is made to order. Custom packaging, sizes, and colors are quoted upon request. Additional charges may apply for custom cuffs. Stock packaging is random coils.

**Specifications:** MIL-T-81914/1; additional sizes including /2, Class 1 & 2 also available

**FEP Convuluted Tubing**



Part Number	MIL Spec*	OD "A" X ID "B"	Nominal ID	Nominal Wall	Pitch
303-0320018-XXXXXX	-01	.320 X .181	.184	.018	8
303-0414018-XXXXXX	-02	.414 X .273	.277	.018	8
303-0450018-XXXXXX	-03	.450 X .306	.309	.018	8
303-0510018-XXXXXX	-04	.510 X .364	.370	.018	8
303-0571018-XXXXXX	-05	.571 X .427	.432	.018	8
303-0650023-XXXXXX	-06	.650 X .485	.493	.023	7
303-0770023-XXXXXX	-07	.770 X .608	.617	.023	7
303-0930023-XXXXXX	-08	.930 X .730	.740	.023	6
303-1073023-XXXXXX	-09	1.073 X .860	.868	.023	5
303-1226023-XXXXXX	-10	1.226 X .975	.988	.023	5
303-1390023-XXXXXX	-11	1.390 X 1.105	1.115	.023	5
303-1539023-XXXXXX	-12	1.539 X 1.210	1.230	.023	4
303-1832023-XXXXXX	-13	1.832 X 1.437	1.469	.023	4
303-2082023-XXXXXX	-14	2.082 X 1.688	1.719	.023	4
303-2332023-XXXXXX	-15	2.332 X 1.937	1.969	.023	4

Convuluted tubing is used in applications where smaller bend diameters are required. Convuluted tubing is made to order. Custom sizes, colors, packaging, PTFE liners, and PFA and ETFE convuluted tubing are quoted upon request.

**\*Specifications:** MIL-T-81914/3; also available to meet /4



## Offer of Sale

The items described in this document and other documents or descriptions provided by Parker Hannifin Corporation, its subsidiaries and its authorized distributors are hereby offered for sale at prices to be established by Parker Hannifin Corporation, its subsidiaries and its authorized distributors. This offer and its acceptance by any customer ("Buyer") shall be governed by all of the following Terms and Conditions. Buyer's order for any such items, when communicated to Parker Hannifin Corporation, its subsidiary or an authorized distributor ("Seller") verbally or in writing, shall constitute acceptance of this offer.

**1. Terms and Conditions of Sale:** All descriptions, quotations, proposals, offers, acknowledgments, acceptances and sales of Seller's products are subject to and shall be governed exclusively by the terms and conditions stated herein. Buyer's acceptance of any offer to sell is limited to these terms and conditions. Any terms or conditions in addition to, or inconsistent with those stated herein, proposed by Buyer in any acceptance of an offer by Seller, are hereby objected to. No such additional, different or inconsistent terms and conditions shall become part of the contract between Buyer and Seller unless expressly accepted in writing by Seller. Seller's acceptance of any offer to purchase by Buyer is expressly conditional upon Buyer's assent to all the terms and conditions stated herein, including any terms in addition to, or inconsistent with those contained in Buyer's offer. Acceptance of Seller's products shall in all events constitute such assent.

**2. Payment:** Payment shall be made by Buyer net 30 days from the date of delivery of the items purchased hereunder. Amounts not timely paid shall bear interest at the maximum rate permitted by law for each month or portion thereof that the Buyer is late in making payment. Any claims by Buyer for omissions or shortages in a shipment shall be waived unless Seller receives notice thereof within 30 days after Buyer's receipt of the shipment.

**3. Delivery:** Unless otherwise provided on the face hereof, delivery shall be made F.O.B. Seller's plant. Regardless of the method of delivery, however, risk of loss shall pass to Buyer upon Seller's delivery to a carrier. Any delivery dates shown are approximate only and Seller shall have no liability for any delays in delivery.

**4. Warranty:** Seller warrants that the items sold hereunder shall be free from defects in material or workmanship for a period of 18 months from date of shipment from Parker Hannifin Corporation. **THIS WARRANTY COMPRISES THE SOLE AND ENTIRE WARRANTY PERTAINING TO ITEMS PROVIDED HEREUNDER. SELLER MAKES NO OTHER WARRANTY, GUARANTEE, OR REPRESENTATION OF ANY KIND WHATSOEVER. ALL OTHER WARRANTIES, INCLUDING BUT NOT LIMITED TO, MERCHANTABILITY AND FITNESS FOR PURPOSE, WHETHER EXPRESS, IMPLIED, OR ARISING BY OPERATION OF LAW, TRADE USAGE, OR COURSE OF DEALING ARE HEREBY DISCLAIMED.**

**NOTWITHSTANDING THE FOREGOING, THERE ARE NO WARRANTIES WHATSOEVER ON ITEMS BUILT OR ACQUIRED WHOLLY OR PARTIALLY, TO BUYER'S DESIGNS OR SPECIFICATIONS.**

**5. Limitation Of Remedy: SELLER'S LIABILITY ARISING FROM OR IN ANY WAY CONNECTED WITH THE ITEMS SOLD OR THIS CONTRACT SHALL BE LIMITED EXCLUSIVELY TO REPAIR OR REPLACEMENT OF THE ITEMS SOLD OR REFUND OF THE PURCHASE PRICE PAID BY BUYER, AT SELLER'S SOLE OPTION. IN NO EVENT SHALL SELLER BE LIABLE FOR ANY INCIDENTAL, CONSEQUENTIAL OR SPECIAL DAMAGES OF ANY KIND OR NATURE WHATSOEVER, INC.**

**LUDING BUT NOT LIMITED TO LOST PROFITS ARISING FROM OR IN ANY WAY CONNECTED WITH THIS AGREEMENT OR ITEMS SOLD HEREUNDER, WHETHER ALLEGED TO ARISE FROM BREACH OF CONTRACT, EXPRESS OR IMPLIED WARRANTY, OR IN TORT, INCLUDING WITHOUT LIMITATION, NEGLIGENCE, FAILURE TO WARN OR STRICT LIABILITY.**

**6. Changes, Reschedules and Cancellations:** Buyer may request to modify the designs or specifications for the items sold hereunder as well as the quantities and delivery dates thereof, or may request to cancel all or part of this order, however, no such requested modification or cancellation shall become part of the contract between Buyer and Seller unless accepted by Seller in a written amendment to this Agreement. Acceptance of any such requested modification or cancellation shall be at Seller's discretion, and shall be upon such terms and conditions as Seller may require.

**7. Special Tooling:** A tooling charge may be imposed for any special tooling, including without limitation, dies, fixtures, molds and patterns, acquired to manufacture items sold pursuant to this contract. Such special tooling shall be and remain Seller's property notwithstanding payment of any charges by Buyer. In no event will Buyer acquire any interest in apparatus belonging to Seller which is utilized in the notwithstanding any charges paid by Buyer. Unless otherwise agreed, Seller shall have the right to alter, discard or otherwise dispose of any special tooling or other property in its sole discretion at any time.

**8. Buyer's Property:** Any designs, tools, patterns, materials, drawings, confidential information or equipment furnished by Buyer or any other items which become Buyer's property, may be considered obsolete and may be destroyed by Seller after two (2) consecutive years have elapsed without Buyer placing an order for the items which are manufactured using such property, Seller shall not be responsible for any loss or damage to such property while it is in Seller's possession or control.

**9. Taxes:** Unless otherwise indicated on the face hereof, all prices and charges are exclusive of excise, sales, use, property, occupational or like taxes which may be imposed by any taxing authority upon the manufacture, sale or delivery of the items sold hereunder. If any such taxes must be paid by Seller or if Seller is liable for the collection of such tax, the amount thereof shall be in addition to the amounts for the items sold. Buyer agrees to pay all such taxes or to reimburse Seller therefore upon receipt of its invoice. If Buyer claims exemption from any sales, use or other tax imposed by any taxing authority, Buyer shall save Seller harmless from and against any such tax, together with any interest or penalties thereon which may be assessed if the items are held to be taxable.

**10. Indemnity For Infringement of Intellectual Property Rights:** Seller shall have no liability for infringement of any patents, trademarks, copyrights, trade dress, trade secrets or similar rights except as provided in this Part 10. Seller will defend and indemnify Buyer against allegations of infringement of U.S. Patents, U.S. Trademarks, copyrights, trade dress and trade secrets (hereinafter 'Intellectual Property Rights'). Seller will defend at its expense and will pay the cost of any settlement or damages awarded in an action brought against Buyer based on an allegation that an item sold pursuant to this contract infringes the Intellectual Property Rights of a third party. Seller's obligation to defend and indemnify Buyer is contingent on Buyer notifying Seller within ten (10) days after Buyer becomes aware of such allegations of infringement, and Seller having sole control over the defense of any allegations or actions including all negotiations for settlement or compromise. If an item sold hereunder is subject to a claim that it infringes the Intellectual Property Rights of a third party, Seller may, at its sole expense and option, procure for Buyer the right to continue using said item, replace or modify said item so as to make it noninfringing, or offer to accept return of said item and return the purchase price less a reasonable allowance for depreciation. Notwithstanding the foregoing, Seller shall have no liability for claims of infringement based on information provided by Buyer, or directed to items delivered hereunder for which the designs are specified in whole or part by Buyer, or infringements resulting from the modification, combination or use in a system of any item sold hereunder. The foregoing provisions of this Part 10 shall constitute Seller's sole and exclusive liability and Buyer's sole and exclusive remedy for infringement of Intellectual Property Rights.

If a claim is based on information provided by Buyer or if the design for an item delivered hereunder is specified in whole or in part by Buyer, Buyer shall defend and indemnify Seller for all costs, expenses or judgments resulting from any claim that such item infringes any patent, trademark, copyright, trade dress, trade secret or any similar right.

**11. Force Majeure:** Seller does not assume the risk of and shall not be liable for delay or failure to perform any of Seller's obligations by reason of circumstances beyond the reasonable control of Seller (hereinafter 'Events of Force Majeure'). Events of Force Majeure shall include without limitation, accidents, acts of God, strikes or labor disputes, acts, laws, rules or regulations of any government or government agency, fires, floods, delays or failures in delivery of carriers or suppliers, shortages of materials and any other cause beyond Seller's control.

**12. Entire Agreement/Governing Law:** The terms and conditions set forth herein, together with any amendments, modifications and any different terms or conditions expressly accepted by Seller in writing, shall constitute the entire Agreement concerning the items sold, and there are no oral or other representations or agreements which pertain thereto. This Agreement shall be governed in all respects by the law of the State of Ohio. No actions arising out of the sale of the items sold hereunder or this Agreement may be brought by either party more than two (2) years after the cause of action accrues.

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# Parker Hannifin Corporation

## About Parker Hannifin Corporation

Parker Hannifin is a leading global motion-control company dedicated to delivering premier customer service. A Fortune 500 corporation listed on the New York Stock Exchange (PH), our components and systems comprise over 1,400 product lines that control motion in some 1,000 industrial and aerospace markets. Parker is the only manufacturer to offer its customers a choice of hydraulic, pneumatic, and electromechanical motion-control solutions. Our Company has the largest distribution network in its field, with over 7,500 distributors serving nearly 400,000 customers worldwide.

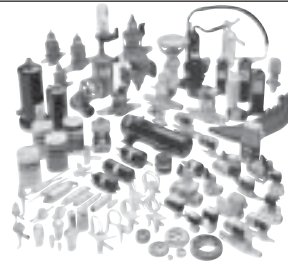
## Parker's Charter

To be a leading worldwide manufacturer of components and systems for the builders and users of durable goods. More specifically, we will design, market and manufacture products controlling motion, flow and pressure. We will achieve profitable growth through premier customer service.

## Product Information

North American customers seeking product information, the location of a nearby distributor, or repair services will receive prompt attention by calling the Parker Product Information Center at our toll-free number: 1-800-C-PARKER (1-800-272-7537). In Europe, call 00800-C-PARKER-H (00800-2727-5374).

The Aerospace Group is a leader in the development, design, manufacture and servicing of control systems and components for aerospace and related high-technology markets, while achieving growth through premier customer service.



The Climate & Industrial Controls Group designs, manufactures and markets system-control and fluid-handling components and systems to refrigeration, air-conditioning and industrial customers worldwide.

The Fluid Connectors Group designs, manufactures and markets rigid and flexible connectors, and associated products used in pneumatic and fluid systems.



The Seal Group designs, manufactures and distributes industrial and commercial sealing devices and related products by providing superior quality and total customer satisfaction.

The Hydraulics Group designs, produces and markets a full spectrum of hydraulic components and systems to builders and users of industrial and mobile machinery and equipment.



The Filtration Group designs, manufactures and markets quality filtration and clarification products, providing customers with the best value, quality, technical support, and global availability.

The Automation Group is a leading supplier of pneumatic and electromechanical components and systems to automation customers worldwide.



The Instrumentation Group is a global leader in the design, manufacture and distribution of high-quality critical flow components for worldwide process instrumentation, ultra-high-purity, medical and analytical applications.



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