

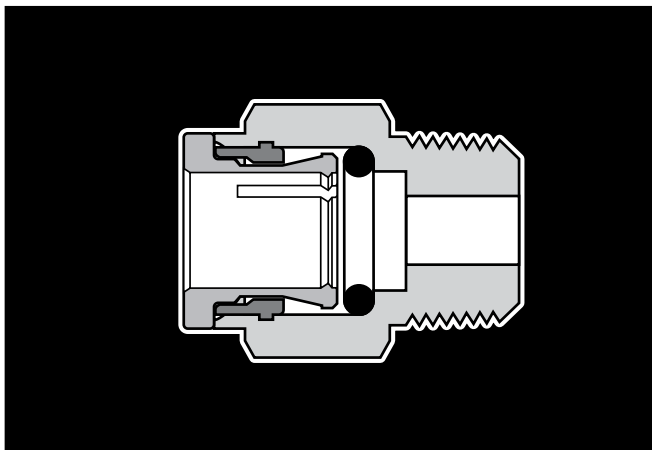
## Section G



**G**



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## Advantages

Ready-to-use miniature one piece fitting for use with most thermoplastic and soft copper tubing. This fitting was designed to meet the needs of the motion control industry where fast assembly, disassembly and reassembly is important. No special tools needed for assembly; just insert the tubing until it bottoms. Microlok is designed to be used without a tube support to provide full flow through the tubing. The collet design of Microlok grips the tubing securely to provide tubing retention. The Microlok fitting comes in externally threaded hex and round straight fitting body styles and in a range of shaped configurations. Microlok straight fittings have a nickel plated brass body and shaped fittings have a composite body with nickel plated brass componentry. Microlok external pipe threads come with a pre-applied white acrylic sealant. Positional external pipe threaded ends are featured on shapes for installation in compact areas and for precise positioning. Microlok should not be used for live swivel applications.

## Materials

Microlok Straights: CA360, CA345 (nickel plated)  
 Microlok Shape Bodies: Reinforced Polyphenylene Oxide (PPO)  
 O-Ring: Nitrile (other compounds available on request)  
 Collet: Nickel Plated Brass

## Applications

Use with Series "U", "LU" and "HU" polyurethane tubing, series "E" polyethylene tubing or series "N" nylon tubing. Microlok was designed to meet the needs of the motion control industry. Consult the factory with any questions regarding special product applications. All applications should be carefully tested through the range of conditions which may be encountered prior to use.

## Working Pressure and Temperature Ranges

32° to +150°F at up to 150 PSI depending on tubing being used. Vacuum applications are dependent upon temperature and type of tubing used.

## Assembly Instructions

1. Cut thermoplastic tubing squarely, using tube cutter. Metal tubing should be cut squarely and free of burrs. Be certain the port or mating part is clean and free of debris.
2. Insert tubing into fitting until it bottoms. A slight twisting motion will ease the insertion. Pull on tubing to verify it is properly retained in the fitting.
3. To disassemble, simply push the collet against the body and remove tubing.

## Order

By part number and name.

## Nomenclature

Part numbers are constructed from symbols that identify the style and size of the fitting. The first series of numbers and letters identify the style and type fitting. The second series of numbers describe the size.

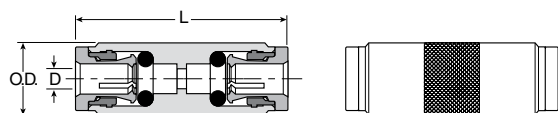
Note: 0 indicates 10-32 UNF Thread

Example	W	68	ML	-4	-2
White Arcylic	_____	_____	_____	_____	_____
Thread Sealant	_____	_____	_____	_____	_____
Male Connector	_____	_____	_____	_____	_____
Microlok	_____	_____	_____	_____	_____
1/4" (4/16) Tube O.D.	_____	_____	_____	_____	_____
1/8" (2/16) Pipe Thread	_____	_____	_____	_____	_____

## Sizes

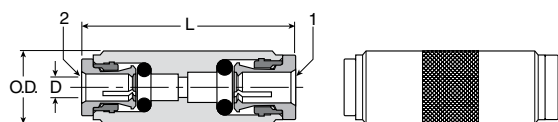
Tube sizes are determined by the number of sixteenths of an inch in the tube O.D..

## Equal Union 62ML



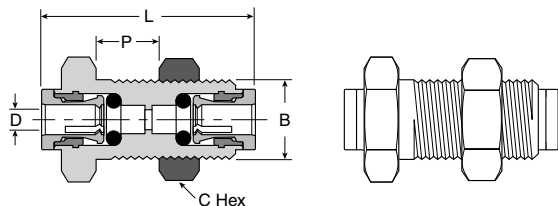
Part No.	Tube Size	O.D.	L	Flow Dia. D.
62ML-2	1/8	0.34	1.02	0.093
62ML-5/32	5/32	0.38	1.03	0.110
62ML-4	1/4	0.47	1.10	0.190
62ML-6	3/8	0.63	1.32	0.312
62ML-8	1/2	0.75	1.43	0.406

## Unequal Union 62ML



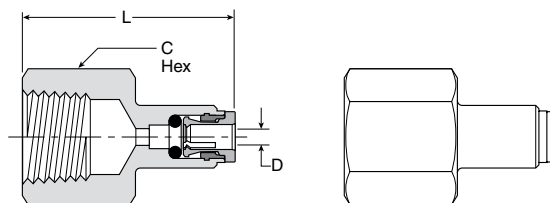
Part No.	Tube Size 1	Tube Size 2	O.D.	L	Flow Dia. D
62ML-5/32-2	5/32	1/8	0.38	1.03	0.093
62ML-4-2	1/4	1/8	0.47	1.09	0.093
62ML-4-5/32	1/4	5/32	0.47	1.09	0.110
62ML-4-6	1/4	3/8	0.63	1.23	0.190
62ML-6-8	3/8	1/2	0.75	1.37	0.312

## Bulkhead Union 62MLBH



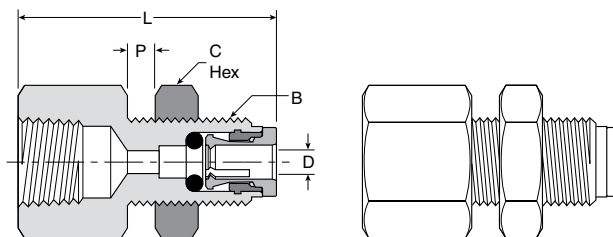
Part No.	Tube Size	B	C Hex	P Max.	L	Flow Dia. D
62MLBH-2	1/8	3/8	1/8	0.51	1.02	0.093
62MLBH-5/32	5/32	7/16	1/2	0.51	1.03	0.110
62MLBH-4	1/4	1/2	5/8	0.55	1.10	0.190
62MLBH-6	3/8	5/8	3/4	0.55	1.32	0.312
62MLBH-8	1/2	3/4	7/8	0.60	1.43	0.406

## Female Connector 66ML



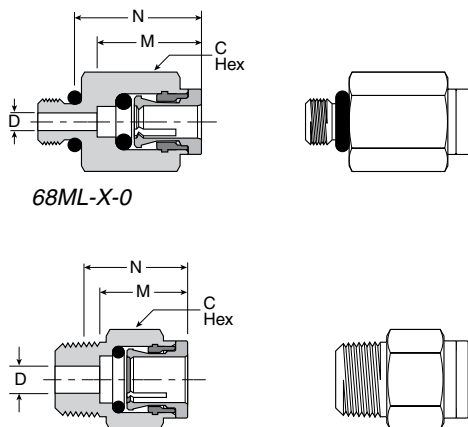
Part No.	Tube Size	Pipe Thread NPTF	C Hex	L	Flow Dia. D.
66ML-2-2	1/8	1/8	9/16	0.99	0.093
66ML-2-4	1/8	1/4	11/16	1.22	0.093
66ML-5/32-2	5/32	1/8	9/16	0.98	0.110
66ML-5/32-4	5/32	1/4	11/16	1.19	0.110
66ML-4-2	1/4	1/8	9/16	0.99	0.190
66ML-4-4	1/4	1/4	11/16	1.20	0.190
66ML-4-6	1/4	3/8	13/16	1.24	0.190
66ML-6-4	3/8	1/4	11/16	1.28	0.312
66ML-6-6	3/8	3/8	13/16	1.28	0.312
66ML-6-8	3/8	1/2	1	1.44	0.312
66ML-8-6	1/2	3/8	13/16	1.35	0.406
66ML-8-8	1/2	1/2	1	1.58	0.406

## Female Bulkhead 66MLBH



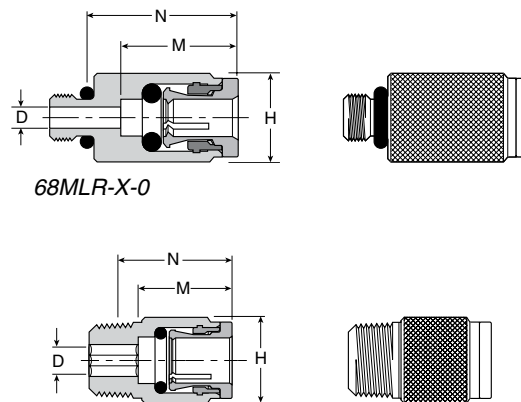
Part No.	Tube Size	Pipe Thread NPTF	B Thread	C Hex	P Max.	L	Flow Dia. D.
66MLBH-2-4	1/8	1/4	3/8-24	11/16	0.31	1.22	0.093
66MLBH-5/32-2	5/32	1/8	7/16-24	9/16	0.36	1.07	0.110
66MLBH-5/32-4	5/32	1/4	7/16-24	9/16	0.36	1.29	0.110
66MLBH-4-2	1/4	1/8	1/2-24	9/16	0.36	1.06	0.190
66MLBH-4-4	1/4	1/4	1/2-24	11/16	0.36	1.25	0.190
66MLBH-6-6	3/8	3/8	5/8-18	13/16	0.36	1.34	0.312
66MLBH-8-6	1/2	3/8	3/4-16	13/16	0.36	1.41	0.406
66MLBH-8-8	1/2	1/2	3/4-16	1	0.36	1.64	0.406

## Microlok Male Connector W68ML



68ML-X-0

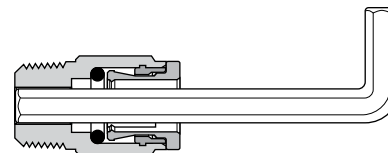
## Microlok Round Body Male Connector W68MLR



68MLR-X-0

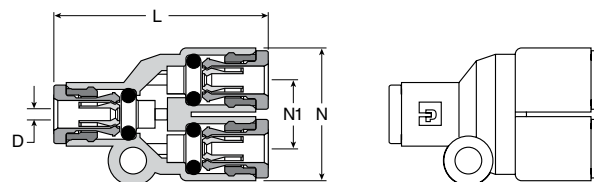
Part No.	Tube Size	Pipe Thread	C Hex	Assm. Ht. N	M	Flow Dia. D
W68ML-2-1	1/8	1/16	3/8	0.50	0.49	0.094
W68ML-2-2	1/8	1/8	7/16	0.46	0.49	0.094
68ML-2-0	1/8	10-32	3/8	0.58	0.49	0.078
W68ML-5/32-1	5/32	1/16	7/16	0.53	0.49	0.094
W68ML-5/32-2	5/32	1/8	7/16	0.33	0.49	0.110
W68ML-5/32-4	5/32	1/4	5/8	0.45	0.49	0.110
68ML-5/32-0	5/32	10-32	7/16	0.60	0.49	0.078
W68ML-4-1	1/4	1/16	7/16	0.64	0.52	0.140
W68ML-4-2	1/4	1/8	1/2	0.52	0.52	0.220
W68ML-4-4	1/4	1/4	5/8	0.46	0.52	0.220
W68ML-4-6	1/4	3/8	11/16	0.50	0.52	0.220
68ML-4-0	1/4	10-32	7/16	0.60	0.52	0.078
W68ML-6-2	3/8	1/8	5/8	0.81	0.63	0.220
W68ML-6-4	3/8	1/4	5/8	0.73	0.63	0.312
W68ML-6-6	3/8	3/8	11/16	0.54	0.63	0.312
W68ML-6-8	3/8	1/2	7/8	0.63	0.63	0.312
W68ML-8-4	1/2	1/4	3/4	0.94	0.68	0.314
W68ML-8-6	1/2	3/8	3/4	0.78	0.68	0.440
W68ML-8-8	1/2	1/2	7/8	0.63	0.68	0.440

Part No.	Tube Size	Pipe Thread	Body Dia. H	Internal Hex	Assm. Ht. N	M	Flow Dia. D
68MLR-2-0	1/8	10-32	0.34	—	0.57	0.49	0.078
W68MLR-5/32-1	5/32	1/16	0.38	1/8	0.55	0.49	0.126
W68MLR-5/32-2	5/32	1/8	0.43	1/8	0.56	0.49	0.126
68MLR-5/32-0	5/32	10-32	0.38	—	0.57	0.49	0.078
W68MLR-4-1	1/4	1/16	0.47	5/32	0.68	0.52	0.156
W68MLR-4-2	1/4	1/8	0.47	3/16	0.59	0.52	0.188
W68MLR-4-4	1/4	1/4	0.59	3/16	0.51	0.52	0.188
68MLR-4-0	1/4	10-32	0.47	—	0.58	0.52	0.094

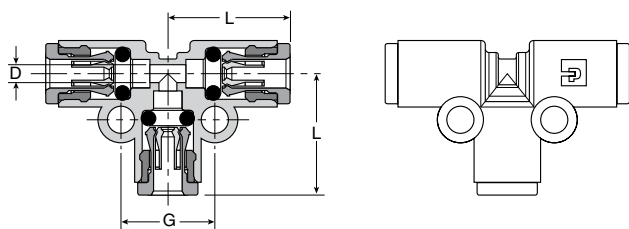


5/32" and larger straight Microlok round body Male Connectors with Pipe Threads have an internal hex for the use of an Allen Key to allow the fitting to be mounted in any position. This also permits close porting not possible with a standard wrench.

## Union Y Connector 362ML

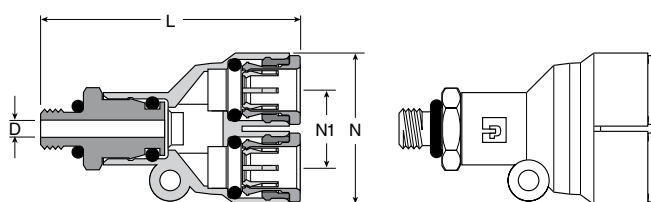
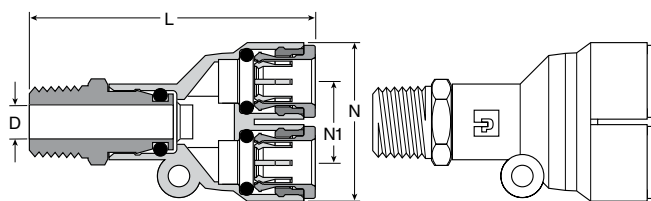


Part No.	Tube Size	Mounting Hole Dia.	L	N	N1	Flow Dia. D
362ML-2	1/8	0.13	1.02	0.64	0.33	0.060
362ML-5/32	5/32	0.13	1.08	0.71	0.38	0.080
362ML-4	1/4	0.13	1.23	0.90	0.48	0.130

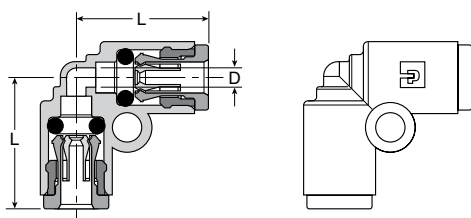
**Union Tee 364ML** Composite Body

Part No.	Tube Size	Mounting Hole Dia.	L	G	Flow Dia. D
364ML-2	1/8	0.13	0.56	0.43	0.081
364ML-5/32	5/32	0.13	0.58	0.46	0.110
364ML-4	1/4	0.13	0.67	0.53	0.190
364ML-6*	3/8	—	0.96	—	0.250
364ML-8*	1/2	—	1.11	—	0.370

\* 3/8 &amp; 1/2 have no mounting hole

**Union Y Male Connector 368ML***368ML-X-0*

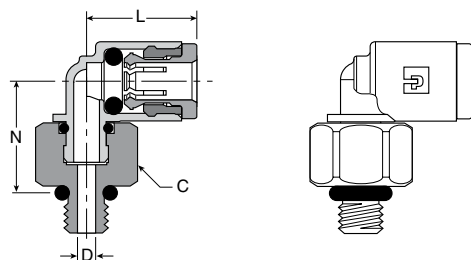
Part No.	Tube Size	Pipe Thread	Mounting Hole Dia.	L	N	N1	Flow Dia. D
368ML-2-0	1/8	10-32	0.13	1.28	0.64	0.33	0.060
W368ML-2-1	1/8	1/16	0.13	1.42	0.64	0.33	0.060
W368ML-2-2	1/8	1/8	0.13	1.42	0.64	0.33	0.060
368ML-5/32-0	5/32	10-32	0.13	1.35	0.71	0.38	0.078
W368ML-5/32-1	5/32	1/16	0.13	1.48	0.71	0.38	0.080
W368ML-5/32-2	5/32	1/8	0.13	1.48	0.71	0.38	0.080
368ML-4-0	1/4	10-32	0.13	1.48	0.90	0.47	0.078
W368ML-4-1	1/4	1/16	0.13	1.62	0.90	0.47	0.130
W368ML-4-2	1/4	1/8	0.13	1.62	0.90	0.47	0.130
W368ML-4-4	1/4	1/4	0.13	1.96	0.90	0.47	0.130

**Union Elbow 365ML** Composite Body

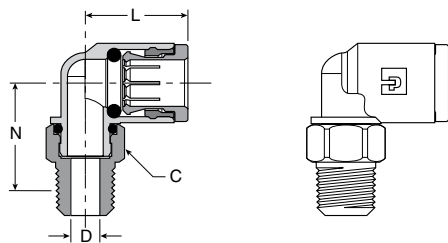
Part No.	Tube Size	Mounting Hole Dia.	L	Flow Dia. D
365ML-2	1/8	0.13	0.56	0.081
365ML-5/32	5/32	0.13	0.58	0.110
365ML-4	1/4	0.13	0.67	0.190
365ML-6*	3/8	—	0.96	0.250
365ML-8*	1/2	—	1.09	0.370

\* 3/8 &amp; 1/2 have no mounting hole

## Male Elbow Swivel 90° W369ML Composite Body

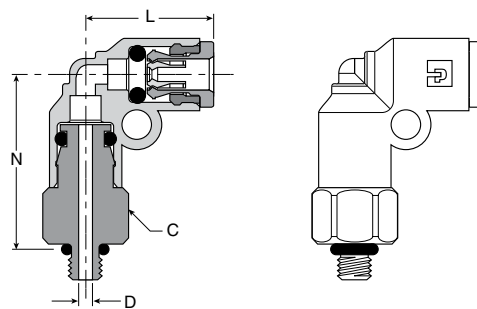


369ML-X-0

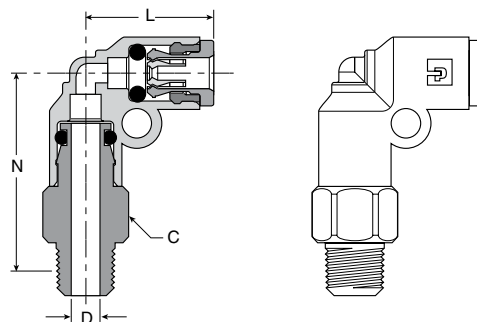


Part No.	Tube Size	Pipe Thread	C Hex	L	Ht. N	Assm. Flow Dia D
369ML-2-0	1/8	10-32	3/8	0.56	0.45	0.078
W369ML-2-1	1/8	1/16	3/8	0.56	0.48	0.110
W369ML-2-2	1/8	1/8	7/16	0.56	0.40	0.110
W369ML-2-4	1/8	1/4	9/16	0.46	0.54	0.110
369ML-5/32-0	5/32	10-32	3/8	0.58	0.45	0.078
W369ML-5/32-1	5/32	1/16	3/8	0.58	0.48	0.110
W369ML-5/32-2	5/32	1/8	7/16	0.58	0.40	0.110
W369ML-5/32-4	5/32	1/4	5/8	0.58	0.49	0.110
369ML-4-0	1/4	10-32	3/8	0.67	0.54	0.078
W369ML-4-1	1/4	1/16	3/8	0.67	0.57	0.156
W369ML-4-2	1/4	1/8	7/16	0.67	0.49	0.195
W369ML-4-4	1/4	1/4	9/16	0.67	0.57	0.195
W369ML-4-6	1/4	3/8	11/16	0.55	0.68	0.195
W369ML-6-2	3/8	1/8	3/4	0.96	0.87	0.220
W369ML-6-4	3/8	1/4	3/4	0.96	0.87	0.250
W369ML-6-6	3/8	3/8	3/4	0.96	0.93	0.250
W369ML-6-8	3/8	1/2	7/8	0.96	1.04	0.250
W369ML-8-4	1/2	1/4	15/16	1.09	1.04	0.313
W369ML-8-6	1/2	3/8	15/16	1.09	1.05	0.375
W369ML-8-8	1/2	1/2	1	1.09	1.12	0.376

## Extended Male Elbow Swivel W369MLX



369MLX-X-0

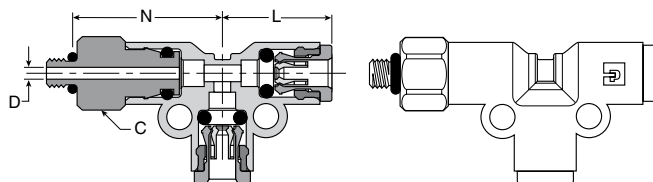


Part No.	Tube Size	Pipe Thread	Mounting Hole Dia.	C Hex	L	Assm. Flow Dia D
369MLX-2-0	1/8	10-32	0.13	3/8	0.56	0.078
W369MLX-2-1	1/8	1/16	0.13	3/8	0.56	0.081
W369MLX-2-2	1/8	1/8	0.13	7/16	0.56	0.081
369MLX-5/32-0	5/32	10-32	0.13	3/8	0.58	0.078
W369MLX-5/32-1	5/32	1/16	0.13	3/8	0.58	0.106
W369MLX-5/32-2	5/32	1/8	0.13	7/16	0.58	0.106
W369MLX-5/32-4	5/32	1/4	0.13	9/16	0.58	0.106
369MLX-4-0	1/4	10-32	0.13	3/8	0.70	1.00
W369MLX-4-1	1/4	1/16	0.13	3/8	0.67	1.05
W369MLX-4-2	1/4	1/8	0.13	7/16	0.67	0.93
W369MLX-4-4	1/4	1/4	0.13	9/16	0.67	1.00
W369MLX-6-4*	3/8	1/4	—	3/4	0.96	1.62
W369MLX-6-6*	3/8	3/8	—	3/4	0.96	1.62
W369MLX-6-8*	3/8	1/2	—	7/8	0.96	1.79
W369MLX-8-4*	1/2	1/4	—	15/16	1.09	1.79
W369MLX-8-6*	1/2	3/8	—	15/16	1.09	1.95
W369MLX-8-8*	1/2	1/2	—	1	1.09	2.02

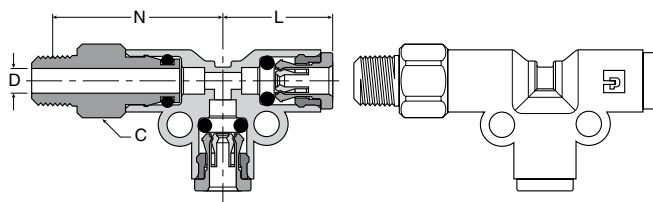
\* 3/8 &amp; 1/2 have no mounting hole



## Male Run Tee Swivel W371ML Composite Body



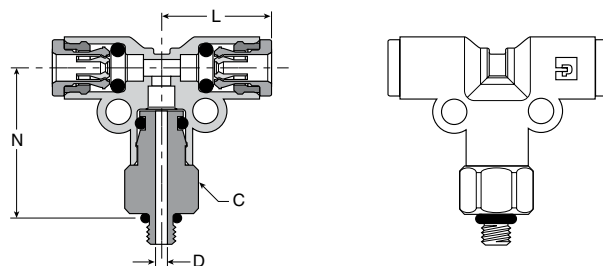
371ML-X-0



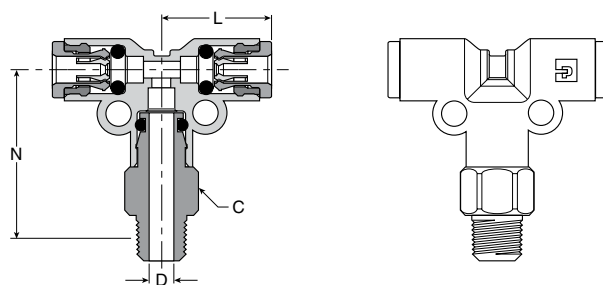
Part No.	Tube Size	Pipe Thread	Mounting Hole Dia.	C Hex	L	Assm. Ht. N	Flow Dia D
371ML-2-0	1/8	10-32	0.13	3/8	0.56	0.85	0.078
W371ML-2-1	1/8	1/16	0.13	3/8	0.56	0.85	0.081
W371ML-2-2	1/8	1/8	0.13	7/16	0.56	0.77	0.081
371ML-5/32-0	5/32	10-32	0.13	3/8	0.58	0.85	0.078
W371ML-5/32-1	5/32	1/16	0.13	3/8	0.58	0.86	0.106
W371ML-5/32-2	5/32	1/8	0.13	7/16	0.58	0.78	0.106
371ML-4-0*	1/4	10-32	—	3/8	0.67	1.00	0.078
W371ML-4-1*	1/4	1/16	—	3/8	0.67	1.05	0.156
W371ML-4-2*	1/4	1/8	—	7/16	0.67	0.93	0.190
W371ML-4-4*	1/4	1/4	—	9/16	0.67	1.00	0.190
W371ML-6-4*	3/8	1/4	—	3/4	0.96	0.97	0.250
W371ML-6-6*	3/8	3/8	—	3/4	0.96	0.94	0.250
W371ML-6-8*	3/8	1/2	—	7/8	0.96	1.05	0.250
W371ML-8-4*	1/2	1/4	—	15/16	1.11	1.07	0.313
W371ML-8-6*	1/2	3/8	—	15/16	1.11	1.08	0.375
W371ML-8-8*	1/2	1/2	—	1	1.11	1.15	0.376

\* 1/4, 3/8 &amp; 1/2 have no mounting hole

## Male Branch Tee Swivel W372ML Composite Body



372ML-X-0



Part No.	Tube Size	Pipe Thread	Mounting Hole Dia.	C Hex	L	Assm. Ht. N	Flow Dia D
372ML-2-0	1/8	10-32	0.13	3/8	0.56	0.85	0.078
W372ML-2-1	1/8	1/16	0.13	3/8	0.56	0.85	0.081
W372ML-2-2	1/8	1/8	0.13	7/16	0.56	0.77	0.081
372ML-5/32-0	5/32	10-32	0.13	3/8	0.58	0.85	0.078
W372ML-5/32-1	5/32	1/16	0.13	3/8	0.58	0.86	0.106
W372ML-5/32-2	5/32	1/8	0.13	7/16	0.58	0.78	0.106
372ML-4-0*	1/4	10-32	—	3/8	0.67	1.00	0.078
W372ML-4-1*	1/4	1/16	—	3/8	0.67	1.05	0.156
W372ML-4-2*	1/4	1/8	—	7/16	0.67	0.93	0.190
W372ML-4-4*	1/4	1/4	—	9/16	0.67	1.00	0.190
W372ML-6-2*	3/8	1/8	—	3/4	0.96	0.91	0.220
W372ML-6-4*	3/8	1/4	—	3/4	0.96	1.00	0.250
W372ML-6-6*	3/8	3/8	—	3/4	0.96	0.97	0.250
W372ML-6-8*	3/8	1/2	—	7/8	0.96	1.08	0.250
W372ML-8-4*	1/2	1/4	—	15/16	1.11	1.04	0.313
W372ML-8-6*	1/2	3/8	—	15/16	1.11	1.05	0.375
W372ML-8-8*	1/2	1/2	—	1	1.11	1.12	0.376

\* 1/4, 3/8 &amp; 1/2 have no mounting hole

## Advantages

Chemical resistant, flexible, low cost, eight colors, five tube sizes and choice of reel lengths.

## Construction

Flexible polyethylene thermoplastic tubing is extruded from high molecular weight resin for increased dimensional stability, uniformity and long-term strength. Its resistance to environmental stress cracking greatly exceeds that of ordinary polyethylene tubing as measured by ASTM D-1693, (10% IGEPAL).

## Applications & Approvals

Polyethylene tubing is available in black as well as seven coding colors as recommended by the Instrument Society of America. Black (EB) tubing contains an ultra-violet inhibitor which is recommended for use in sunlit areas. Ingredients of natural and color tubing (except black) listed below meet FDA requirements for food contact applications. All tubing conforms to ASTM D-1248, Type I, Class A, Category 4, Grade E5.

## Temperature Range

Suggested operating temperature range is -80°F to 150°F (-62°C to 66°C).

## Fitting Recommendation

- Brass fittings

## Nomenclature

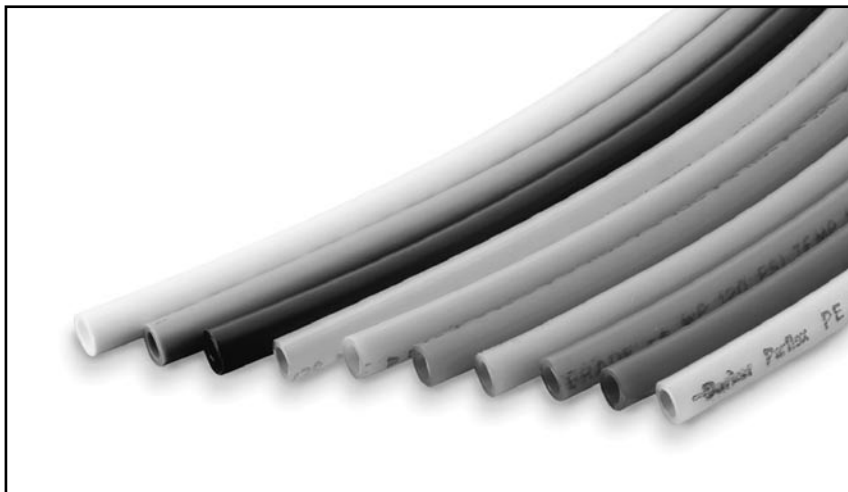
Part numbers are constructed from symbols that identify the style and size of the fitting. Letters identify style and material. Numbers identify size in 1/16's of an inch.

### Example:

Polyethylene ——— E - 6  
 3/8" (6/16) Tube O.D. ——— 4 - Y  
 1/4" (4/16) Tube I.D. ——— 0500  
 Color, Yellow ———  
 Reel Footage ———

## E Instrument Grade Tubing

Part Number	Color	O.D.	I.D.	Wall	Reel Length Feet	Working Pressure psi at 73°F	Min. Burst psi at 73°F	Min. Bend Radius Inches	Weight Per 100 Feet
E-43-0100	Natural	1/4	0.170	0.040	100	120	625	1	1.1
E-43-0500	Natural	1/4	0.170	0.040	500	120	625	1	1.1
E-43-1000	Natural	1/4	0.170	0.040	1000	120	625	1	1.1
EB-43-0100	Black	1/4	0.170	0.040	100	120	625	1	1.1
EB-43-0500	Black	1/4	0.170	0.040	500	120	625	1	1.1
EB-43-1000	Black	1/4	0.170	0.040	1000	120	625	1	1.1
E-43-R-0100	Red	1/4	0.170	0.040	100	120	625	1	1.1
E-43-R-0500	Red	1/4	0.170	0.040	500	120	625	1	1.1
E-43-B-0100	Blue	1/4	0.170	0.040	100	120	625	1	1.1
E-43-B-0500	Blue	1/4	0.170	0.040	500	120	625	1	1.1
E-43-O-0500	Orange	1/4	0.170	0.040	500	120	625	1	1.1
E-43-Y-0500	Yellow	1/4	0.170	0.040	500	120	625	1	1.1
E-43-P-0500	Purple	1/4	0.170	0.040	500	120	625	1	1.1
E-43-G-0500	Green	1/4	0.170	0.040	500	120	625	1	1.1
E-53-0500	Natural	5/16	0.187	0.062	500	145	800	1-1/8	2.1
EB-53-0500	Black	5/16	0.187	0.062	500	145	800	1-1/8	2.1
E-64-0100	Natural	3/8	0.250	0.062	100	125	675	1-1/4	2.5
E-64-0500	Natural	3/8	0.250	0.062	500	125	675	1-1/4	2.5
EB-64-0100	Black	3/8	0.250	0.062	100	125	675	1-1/4	2.5
EB-64-0500	Black	3/8	0.250	0.062	500	125	675	1-1/4	2.5
E-64-R-0500	Red	3/8	0.250	0.062	500	125	675	1-1/4	2.5
E-64-B-0500	Blue	3/8	0.250	0.062	500	125	675	1-1/4	2.5
E-64-O-0500	Orange	3/8	0.250	0.062	500	125	675	1-1/4	2.5
E-64-Y-0500	Yellow	3/8	0.250	0.062	500	125	675	1-1/4	2.5
E-64-P-0500	Purple	3/8	0.250	0.062	500	125	675	1-1/4	2.5
E-64-G-0500	Green	3/8	0.250	0.062	500	125	675	1-1/4	2.5
E-86-0100	Natural	1/2	0.375	0.062	100	90	425	2-1/2	3.6
EB-86-0100	Black	1/2	0.375	0.062	100	90	425	2-1/2	3.6
E-108-0100	Natural	5/8	0.500	0.062	100	70	325	4	4.6
EB-108-0100	Black	5/8	0.500	0.062	Coil	70	325	4	4.6





## Construction & Approvals

Flame resistant polyethylene is manufactured from a distinctively formulated compound which meets the UL94 V-2 flame classification. It also meets the flame spread, fuel contribution and smoke density requirements of the ASTM E84-81a tunnel test.

## Applications

Parker series FRPE tubing is the preferred product for pneumatic control applications in the heating- ventilating- air conditioning-energy conservation industry. It is also suitable for use in petrochemical plants, petroleum refineries, pulp and paper mills, mines, steel mills and other industries where protection against intermittent flame and hot sparks is necessary.

## Temperature Range

Suggested operating temperature range is -85°F to 150°F (-65°C to +66°C).

## Nomenclature

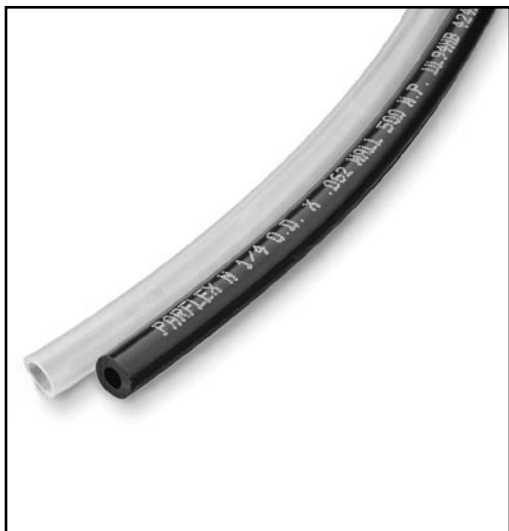
Order by tubing part number and name.

### Example:

FR PE 4 — 0500  
 Flame Resistant —  
 Polyethylene —  
 1/4" (4/16) Tube O. D. —  
 Reel Footage —

## FRPE Flame Resistant Tubing

Part Number	Color	O.D.	I.D.	Wall	Reel Length Feet	Working Pressure psi at 73°F	Min. Burst psi at 73°F	Min. Bend Radius Inches	Weight Per 100 Feet
FRPE2.5-0500	Black	5/32	0.096	0.030	500	225	900	1/2	0.56
FRPE4-0250	Black	1/4	0.170	0.040	250	160	650	3/4	1.24
FRPE4-0500	Black	1/4	0.170	0.040	500	160	650	3/4	1.24
FRPE4-1000	Black	1/4	0.170	0.040	1000	160	650	3/4	1.24
FRPE6-0250	Black	3/8	0.250	0.062	250	195	780	1-1/2	2.90
FRPE6-0500	Black	3/8	0.250	0.062	500	195	780	1-1/2	2.90
FRPE8-0250	Black	1/2	0.375	0.062	250	135	540	1-3/4	4.05



## Nomenclature

Order by tubing part number and name.

### Example:

Nylon \_\_\_\_\_ N N — 2 — 016  
 Color, Natural \_\_\_\_\_  
 1/8" (2/16) Tube O.D. \_\_\_\_\_  
 Wall Thickness in thousandths of an inch \_\_\_\_\_

## Advantages

Flexible nylon tubing is carefully made from high-grade, abrasion-resistant, heat-and light-stabilized nylon. Resistance to stress-cracking greatly exceeds that of ordinary nylon tubing. Extremely low level water absorption.

Chemical-resistant nylon tubing has the additional benefits of better flexibility, lighter weight and resistance to flexural fatigue.

## Colors

Available in natural (NN) and black (NB). Black tubing is recommended for use outdoors and in sunlit areas.

## Temperature Range

Operating temperatures, depending upon conditions, are -65°F to 200°F (-54°C to 93°C) continuous.

## Fitting Recommendations

- Brass fittings

## N Flexible Tubing

Nylon Part No.	Color	Nom. Tube O.D.	Nom. Tube I.D.	Average Wall Thick.	*Min. Burst Pressure at 73°F psi	Min. Bend Radius Inches	Std. Reel Length Feet
NN-2-016	Natural	1/8	0.093	0.016	1000	1/4	250
NB-2-016	Black	1/8	0.093	0.016	1000	1/4	250
NN-2-031	Natural	1/8	0.064	0.031	2000	1/4	250
NB-2-031	Black	1/8	0.064	0.031	2000	1/4	250
NN-2.5-025	Natural	5/32	0.106	0.025	1200	1/2	250
NB-2.5-025	Black	5/32	0.106	0.025	1200	1/2	250
NN-3-025	Natural	3/16	0.138	0.025	1000	5/8	250
NB-3-025	Black	3/16	0.138	0.025	1000	5/8	250
NN-3-046	Natural	3/16	0.096	0.046	2000	7/16	250
NB-3-046	Black	3/16	0.096	0.046	2000	7/16	250
NN-4-035	Natural	1/4	0.180	0.035	1000	7/8	250
NB-4-035	Black	1/4	0.180	0.035	1000	7/8	250
NN-4-040	Natural	1/4	0.170	0.040	1250	7/8	250
NB-4-040	Black	1/4	0.170	0.040	1250	7/8	250
NN-4-062	Natural	1/4	0.127	0.062	2000	1/2	250
NB-4-062	Black	1/4	0.127	0.062	2000	1/2	250
NN-5-040	Natural	5/16	0.233	0.040	1250	1-1/8	250
NB-5-040	Black	5/16	0.233	0.049	1250	1-1/8	250
NN-6-050	Natural	3/8	0.275	0.050	1250	1-1/8	250
NB-6-050	Black	3/8	0.275	0.050	1250	1-1/8	250
NN-6-093	Natural	3/8	0.190	0.093	2000	3/4	250
NB-6-093	Black	3/8	0.190	0.093	2000	3/4	250
NN-8-062	Natural	1/2	0.375	0.062	1000	1-1/4	250
NB-8-062	Black	1/2	0.375	0.062	1000	1-1/4	250
NN-8-124	Natural	1/2	0.253	0.124	2000	1	250
NB-8-124	Black	1/2	0.253	0.124	2000	1	250

\*Suggested working pressure is 1/4 of burst pressure.



## Fitting Recommendations

- Brass fittings

## Nomenclature

Order by tubing part number and name.

### Example:

Nylon \_\_\_\_\_ N \_\_\_\_\_ B \_\_\_\_\_ R \_\_\_\_\_ 2 \_\_\_\_\_ 016  
 Color, Black \_\_\_\_\_  
 Rigid \_\_\_\_\_  
 1/8" (2/16) Tube O.D. \_\_\_\_\_  
 Wall Thickness in thousandths of an inch \_\_\_\_\_

## Advantages

Series NR semi-rigid nylon tubing offers better chemical resistance than series N, good resistance to high ambient temperature and low moisture absorption. NR has a high tensile strength which will give excellent coupling retention in high pressure, temperature and vibration environments.

## Construction

Parker series NR tubing is manufactured from a semi-rigid nylon II material. The tubing does not contain plasticizers.

## Applications & Approvals

NR tubing is specified for machine tool lubricating systems, marine control systems, process lines for chemicals and oils and other applications requiring a high quality nylon tube.

## Temperature Range

The recommended operating temperature range for service at rated pressures with compatible fluids is -60°F to 200°F (-51°C to 93°C).

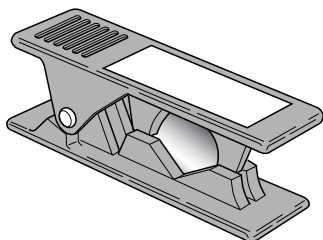
## NR Semi-rigid High Strength Tubing

Nylon Part No.	Color	Nom. Tube O.D.	Nom. Tube I.D.	Average Wall Thick.	*Min. Burst Pressure at 73 °F psi	Min Bend Radius Inches	Std. Reel Length Feet
NNR-2-017	Natural	1/8	0.091	0.017	1700	1/2	500
NBR-2-017	Black	1/8	0.091	0.017	1700	1/2	500
NNR-2-026	Natural	1/8	0.073	0.026	2500	3/8	500
NBR-2-026	Black	1/8	0.073	0.026	2500	3/8	500
NNR-3-024	Natural	3/16	0.140	0.024	1700	3/4	500
NBR-3-024	Black	3/16	0.140	0.024	1700	3/4	500
NNR-3-039	Natural	3/16	0.110	0.039	2500	5/8	500
NBR-3-039	Black	3/16	0.110	0.039	2500	5/8	500
NNR-4-035	Natural	1/4	0.180	0.035	1700	1	250
NBR-4-035	Black	1/4	0.180	0.035	1700	1	250
NNR-4-050	Natural	1/4	0.150	0.050	2500	7/8	250
NBR-4-050	Black	1/4	0.150	0.050	2500	7/8	250
NNR-5-040	Natural	5/16	0.233	0.040	1700	1-1/2	250
NBR-5-040	Black	5/16	0.233	0.040	1700	1-1/2	250
NNR-6-048	Natural	3/8	0.279	0.048	1700	1-3/4	250
NBR-6-048	Black	3/8	0.279	0.048	1700	1-3/4	250
NNR-6-075	Natural	3/8	0.225	0.075	2500	1-1/2	250
NBR-6-075	Black	3/8	0.225	0.075	2500	1-1/2	250
NNR-8-062	Natural	1/2	0.376	0.062	1500	2-3/8	250
NBR-8-062	Black	1/2	0.376	0.062	1500	2-3/8	250
NNR-8-075	Natural	1/2	0.350	0.075	2200	2-1/2	250
NBR-8-075	Black	1/2	0.350	0.075	2200	2-1/2	250

\*Suggested working pressure is 1/4 of burst pressure.

## PTC Plastic Tube Cutter

Part No. PTC



An easy to handle razor/edged tube cutter, closes automatically, assuring clean and square cuts.

May be used with polyethylene, polypropylene, nylon and other plastic tubing.

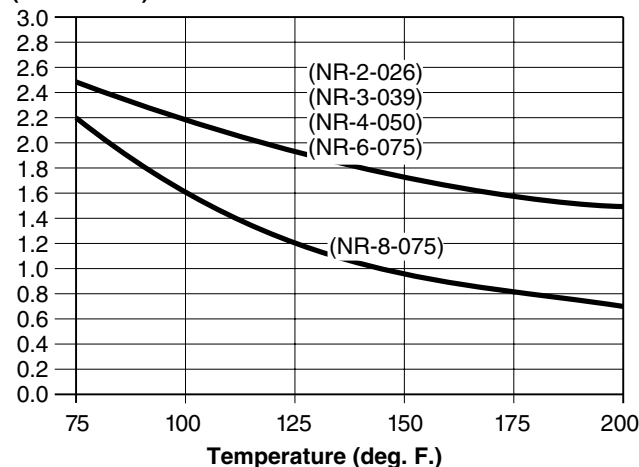
## How To Use

Insert plastic tube to desired length, allow tube cutter to close, then apply pressure until tube snaps off.

## Nylon Semi-Rigid Tubing

NR Series (NNR, NBR)  
 1/8 thru 1/2 O.D. Inches

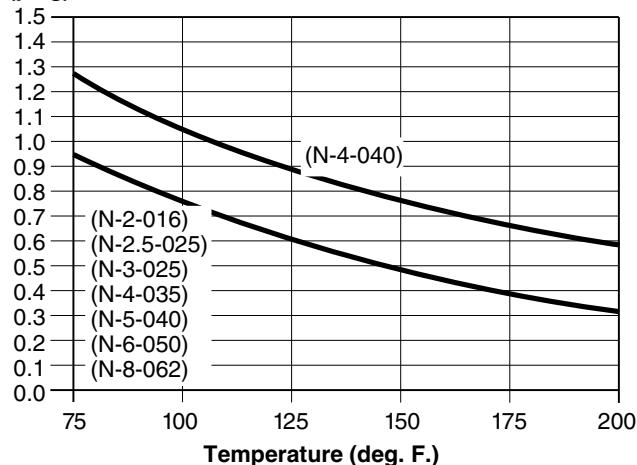
**Minimum  
 Burst Pressure  
 (psig)  
 (Thousands)**



## Nylon Flexible Tubing

N Series (NN, NB)  
 1/8 thru 1/2 O.D. Inches

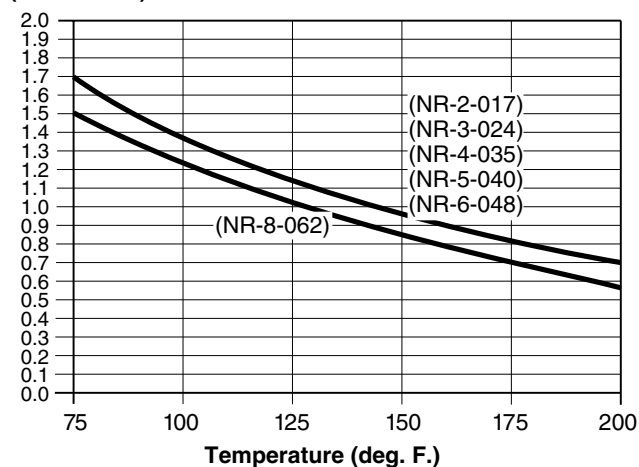
**Minimum  
 Burst Pressure  
 (psig)**



## Nylon Semi-Rigid Tubing

NR Series (NNR, NBR)  
 1/8 thru 1/2 O.D. Inches

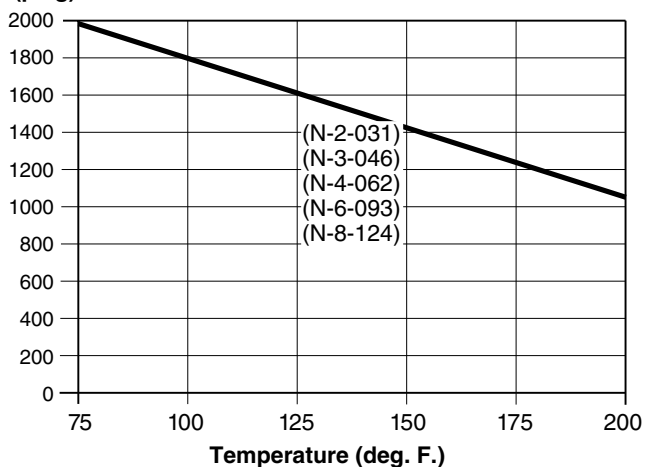
**Minimum  
 Burst Pressure  
 (psig)  
 (Thousands)**



## Nylon Flexible Tubing

N Series  
 1/8 thru 1/2 O.D. Inches

**Minimum  
 Burst Pressure  
 (psig)**

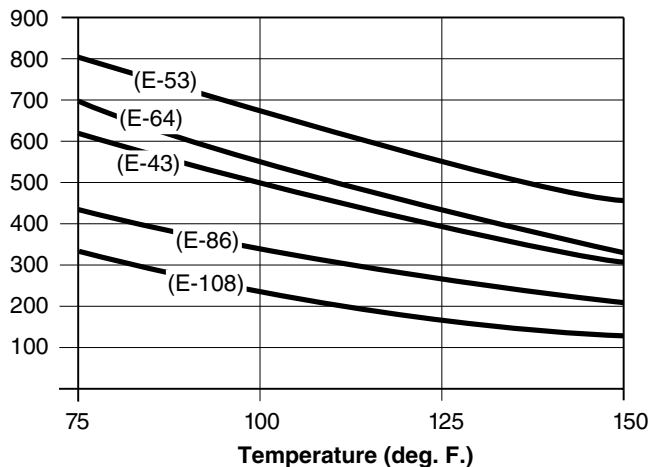


Suggested working pressures are 1/4 of burst pressure at system operating temperature.

## Polyethylene Tubing

Laboratory Grade E Series  
 1/4 thru 5/8 O.D.

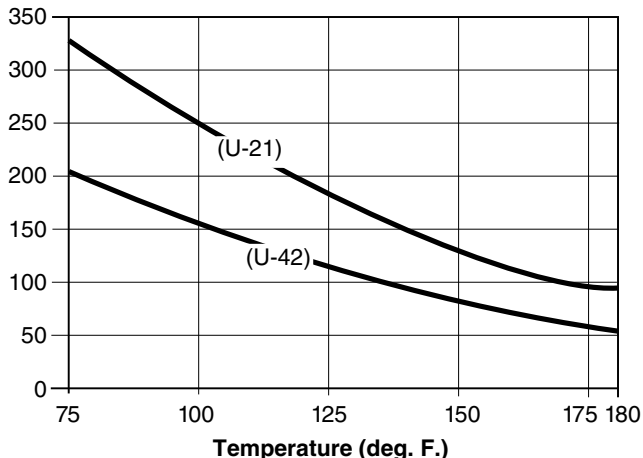
**Minimum  
 Burst  
 Pressure**



## Polyethylene Tubing

"U" Series  
 1/8 thru 1/4 O.D.  
 Polyether Base

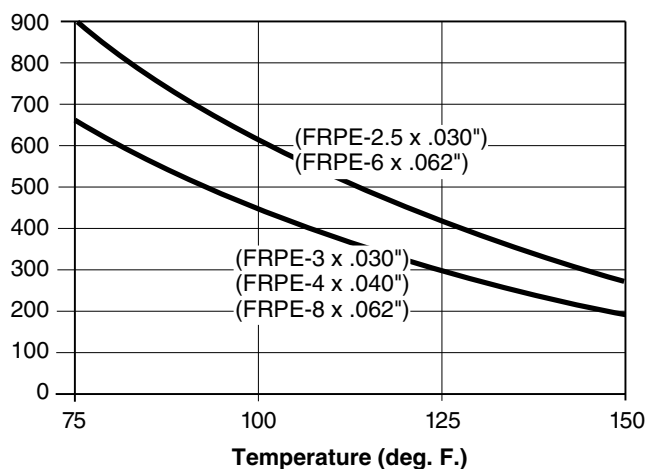
**Minimum  
 Burst  
 Pressure**



## Polyethylene Tubing

Flame Resistant FRPE Series  
 5/32 thru 1/2 O.D.

**Minimum  
 Burst  
 Pressure**



Suggested working pressures are 1/4 of burst pressure at system operating temperature.

	All Brass Body Fittings (Except Prestolok) Rating	Prestolok Fitting Rating		All Brass Body Fittings (Except Prestolok) Rating	Prestolok Fitting Rating
Acetic Acid	4	4	Citric Acid	3	3
Acetic Anhydride	4	4	Coffee	1	4
Acetone	1	4	Copper Chloride	4	4
Alum	4	4	Copper Sulfate	4	4
Aluminum Chloride	4	4	Corn Oil	2	2
Aluminum Sulfate	4	4	Cottonseed Oil	2	2
Ammonium Hydroxide	4	4	Creosote	2	2
Ammonium Chloride	4	4	Crude Oil	3	3
Ammonium Nitrate	4	4	Ethers	1	4
Ammonium Sulfate	4	4	Ethyl Acetate	2	4
Amyl Acetate	2	4	Ethyl Chloride	3	3
Aniline	3	4	Ethylene Glycol	2	2
Aniline Dyes	3	4	Ferric Chloride	4	4
Asphalt	1	2	Formaldehyde	3	3
Barium Chloride	4	4	Furfural	3	4
Beer	2	4	Gelatine	1	1
Beet Sugar Syrups	2	2	Glucose	1	1
Benzoic Acid	2	4	Glycerine	1	1
Black Liquor, Sulfate Process	4	4	Hydrobromic Acid	4	4
Bleaching Powder, Wet	4	4	Hydrochloric Acid	4	4
Borax	1	2	Hydrocyanic Acid	4	4
Bordeaux Mixture	2	2	Hydrofluoric Acid	4	4
Boric Acid	2	2	Hydrofluosilicic Acid	4	4
Bromine, Dry	1	4	Hydrogen Peroxide	3	4
Bromine, Moist	4	4	Hydrogen Sulfide, Moist	3	4
Butyric Acid	3	4	Lacquers	1	4
Calcium Bisulfite	4	4	Lacquer Solvents	1	4
Calcium Chloride	4	4	Lactic Acid Cold	3	3
Calcium Hydroxide	2	2	Lime	1	1
Calcium Hypochlorite	4	4	Lime-Sulfur	2	4
Cane Sugar Syrups	2	2	Linseed Oil	2	2
Carbolic Acid	2	4	Magnesium Chloride	4	4
Carbon Dioxide, Dry	1	1	Magnesium Hydroxide	1	2
Carbon Dioxide, Moist	3	3	Magnesium Sulfate	3	3
Carbon Disulfide	1	4	Methyl Chloride, Dry	1	4
Carbon Tetrachloride, Moist	4	4	Milk	2	4
Castor Oil	1	1	Nitric Acid	4	4
Chlorine, Dry	1	4	Nitrogen	1	1
Chlorine, Moist	4	4	Oleic Acid	3	3
Chloroacetic Acid	4	4	Oxalic Acid	3	3
Chloroform, Dry	1	4	Palmitic Acid	3	3

1 — SATISFACTORY

2 — FAIR

3 — RECOMMEND TESTING

4 — UNSATISFACTORY



	All Brass Body Fittings (Except Prestolok) Rating	Prestolok Fitting Rating		All Brass Body Fittings (Except Prestolok) Rating	Prestolok Fitting Rating
Phosphoric Acid	4	4	Sodium Sulfite	4	4
Potassium Chloride	4	4	Sodium Thiosulfate	2	2
Potassium Cyanide	4	4	Steam	3	4
Potassium Dichromate, Acid	4	4	Stearic Acid	3	3
Potassium Hydroxide	3	3	Sulfur, Dry	1	4
Potassium Sulfate	2	2	Sulfur Chloride, Dry	1	4
Sea Water	3	3	Sulfur Dioxide, Dry	1	4
Soap Solutions	2	2	Sulfur Dioxide, Moist	4	4
Sodium Bicarbonate	3	3	Sulfur Trioxide, Dry	1	4
Sodium Bisulfate	4	4	Sulfuric Acid	4	4
Sodium Bisulfite	4	4	Sulfurous Acid	4	4
Sodium Carbonate	2	2	Tar	2	2
Sodium Chloride	4	4	Tartaric Acid	3	3
Sodium Cyanide	4	4	Toluene	1	4
Sodium Hydroxide	3	3	Trichloroacetic Acid	4	4
Sodium Hypochlorite	4	4	Trichlorethylene, Dry	1	3
Sodium Nitrate	3	3	Trichlorethylene, Moist	3	3
Sodium Peroxide	4	4	Vinegar	4	4
Sodium Phosphate	2	2	Zinc Chloride	4	4
Sodium Silicate	2	2	Zinc Sulfate	4	4

1 — SATISFACTORY

2 — FAIR

3 — RECOMMEND TESTING

4 — UNSATISFACTORY

This brass compatibility chart is a ready reference for brass fittings with various media. It is intended as a guide to chemical compatibility and has been compiled from the best available sources. Many factors (concentration, temperature, intermittent or continuous exposure, etc.) have a bearing upon the suitability of any material and, therefore, no guarantee, expressed or implied, is made to compatibility in any specific set of circumstances.

G

Media	E	FRPE	N	NR	Media	E	FRPE	N	NR
	"E" Series Polyethylene	Flame Resistant Polyethylene	Nylon "N"	Nylon "NR"		"E" Series Polyethylene	Flame Resistant Polyethylene	Nylon "N"	Nylon "NR"
Acetaldehyde	L	—	L	G	Glucose	G	G	G	G
Acetates	G	—	L	G	Glycerine	G	G	G	G
Acetic Acid	L	—	L	G	Hydriodic Acid	L	—	P	L
Acetic Anhydride	L	—	P	L	Hydrochloric Acid (Conc.)	L	—	L	L
Acetone	G	L	L	G	Hydrochloric Acid (Med. Conc.)	L	—	L	G
Acetyl Bromide	L	—	L	—	Hydrofluoric Acid	L	—	P	P
Acetyl Chloride	L	—	L	—	Hydrogen Peroxide (Conc.)	L	—	L	G
Air	G	G	G	G	Hydrogen Peroxide (Dil.)	L	—	L	G
Alcohols	G	G	G	G	Hydrogen Sulfide	G	—	G	G
Aluminum Salts	G	G	G	G	Iodine	L	—	G	G
Ammonia	G	L	G	G	Kerosene	L	—	G	G
Amyl Acetate	G	—	L	G	Ketones	G	—	G	G
Aniline	L	—	L	L	Lacquer Solvent	L	—	L	L
Animal Oils	L	—	G	G	Lactic Acid	G	—	G	G
Arsenic Salts	G	G	G	G	Lead Acetate	G	—	G	G
Aromatic Hydrocarbons	P	P	L	G	Linseed Oil	L	—	G	G
Barium Salts	G	G	G	G	Magnesium Salts	G	—	G	G
Benzaldehyde	P	P	L	G	Naphtha	L	G	G	G
Benzene (Benzol)	P	P	L	G	Natural Gas	L	—	G	G
Benzyl Alcohol	P	P	L	L	Nickel Salts	G	—	G	G
Bleaching Liquors	G	—	L	L	Nitric Acid (Conc.)	P	G	P	P
Boric Acid Solutions	G	G	G	G	Nitric Acid (Dil.)	P	P	L	L
Bromine	L	—	L	P	Nitrobenzene	P	P	L	L
Butane	L	—	P	G	Nitrogen Oxides	L	—	L	L
Butanol	G	G	G	G	Nitrous Acid	L	—	L	L
Butyl Acetate	G	G	G	G	Oils (Animal and Mineral)	L	—	G	G
Calcium Salts	G	G	G	G	Oils (Vegetable)	L	—	L	G
Carbon Dioxide	G	G	G	G	Oxygen	G	G	G	G
Carbon Disulfide	L	—	L	G	Perchloric Acid	P	P	P	P
Carbon Tetrachloride	P	P	L	L	Phenol	P	P	P	P
Caustic Potash	G	—	G	G	Potassium Salts	G	G	G	G
Caustic Soda	G	—	G	G	Pyridine	L	—	L	L
Chloroacetic Acid	L	—	L	L	Silver Nitrate	G	G	G	G
Chlorine (Dry)	L	—	L	P	Soap Solutions	G	G	G	G
Chlorine (Wet)	L	—	L	P	Sodium Salts	G	G	G	G
Chlorobenzene	P	P	L	L	Stearic Acid	L	—	G	G
Chloroform	P	P	L	L	Sulfur Chloride	L	—	L	L
Chromic Acid	L	—	P	P	Sulfuric Acid (Conc.)	P	P	P	P
Copper Salts	G	G	G	G	Sulfuric Acid (Dil.)	P	P	G	L
Cresol	P	P	L	P	Sulfurous Acid	P	P	L	L
Cyclohexanone	L	—	L	G	Tannic Acid	G	—	G	G
Ethers	L	—	L	G	Tanning Extracts	G	—	G	G
Ethyl Acetate	G	—	L	G	Titanium Salts	G	G	G	G
Ethyl Alcohol	G	G	L	G	Toluene (Toluol)	P	P	L	G
Ethylamine	L	—	L	L	Trichloroacetic Acid	L	—	P	P
Ethyl Bromide	P	P	L	L	Trichlorethylene	P	P	G	L
Ethyl Chloride	P	P	L	L	Turpentine	L	—	G	G
Fatty Acids	L	P	G	G	Urea	G	—	G	G
Ferric Salts	G	—	G	G	Uric Acid	G	—	G	G
Formaldehyde	G	—	L	G	Water	G	G	G	G
Formic Acid	L	G	L	P	Xylene (Xylol)	P	P	L	G
Freon	L	—	L	G	Zinc Chloride	G	—	G	G
Gasoline	P	P	G	G					

**Ratings Code (1)**

G — Good to excellent. Little or no swelling, tensile or surface changes. Preferred choice.

L — Marginal or conditional. Noticeable effects but not necessarily indicating lack of serviceability. Further testing suggested for specific application. Very long term effects such as stiffening or potential for crazing should be evaluated.

P — Poor or unsatisfactory. Not recommended without extensive and realistic testing.

— — Not tested.

**NOTE:** For Footnotes (1), (2), (3), (4), (5), (6), & (7), See Page 19.

## Footnotes for Chemical Compatibility Guides for Thermoplastic Fittings, Tubing and Hose

- (1) The Chemical Compatibility Guides are simplified rating tabulations based on immersion tests at 75°F. Higher temperatures tend to reduce ratings. **Since final selection depends on pressure, media and ambient temperature and other factors not known to The Company, no performance guarantee is expressed or implied.** Ratings do not imply compliance with specialized codes such as FDA, NSF, AGA or UL and do not cover possible fluid discoloration, taste or odor effects. For conveying foodstuffs use FDA sanctioned materials, and for potable water use NSF approved materials. For chemicals not listed, or for advice on particular applications, please consult the supplier.
- (2) Hose applications for these fluids must take into account legal and insurance regulations. This does not imply AGA or UL compliance.
- (3) Satisfactory at some concentrations and temperatures, unsatisfactory in others.
- (4) For high pressure gases, the cover should be pinpricked and the pressure must not be released quickly. Chain or restrain the hose to prevent personal injury in the event of damage or failure.
- (5) Chemical compatibility **does not** imply low permeation rates. Consult the supplier for a recommendation for your specific requirements.
- (6) Does not imply NSF or FDA compliance.
- (7) Chemical compatibility does not imply acceptability for use in **airless paint spray** applications. These applications require a special **conductive** hose.

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## Offer of Sale

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**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.

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**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 limitations, 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 manufacture of the items sold hereunder, even if such apparatus has been specially converted or adapted for such manufacture and notwithstanding any charges paid

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**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 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.