TexLoc™

PRECISION FLUOROPLASTIC TUBING

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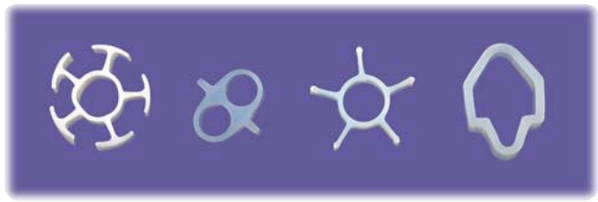
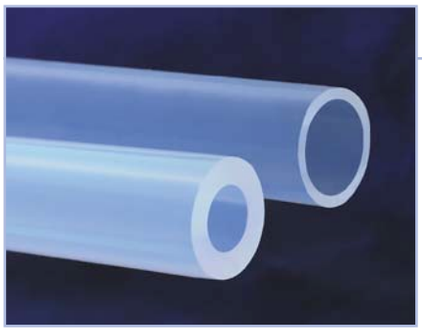
TexLoc is a world-class innovator in the design, development and manufacture of precision fluoroplastic tubing products. TexLoc tubing and related products are used in a wide range of applications throughout various industries worldwide. Guided by the demands of industry and technology, TexLoc engineers work closely with our customers to create products that are precision engineered to meet specific needs in a multitude of applications. In addition, our ability to work with low volume start up projects coupled with our in-house R&D facilities ensure the advantage of a comprehensive partnership that serves both our largest and smallest customers.

Our highly skilled engineering staff possesses extensive knowledge in the rapidly expanding technology of fluoroplastics and the diversity of its applications. TexLoc engineers draw on years of proven experience in process validation and design of experiment (D.O.E.) procedures to guarantee our customers a consistent and superior product. Our Quality Assurance department plays an integral part in the complete product manufacturing process. In addition, TexLoc is able to provide complete traceability on each and every lot of tubing produced. TexLoc's medical production group, **TexMed**, offers USP Class VI compliant tubing that is inspected, cleaned and packaged in our on-site Class 10,000 clean room facility.

Material and size diversity are also important at TexLoc**.** We take pride in offering a broad selection of fluoroplastic and thermoplastic resins utilized in producing tubing in a multitude of sizes and wall thicknesses. In order to serve our customers better, we are continually adding to our selection of materials, product lines and size capabilities. At TexLoc**,** our on-site value added service department offers an array of custom oriented secondary services to compliment our production capabilities and superior quality. These services are in place to meet the increasing demand for customization and specific design criteria that our customers expect from a world-class supplier of precision fluoroplastic products.





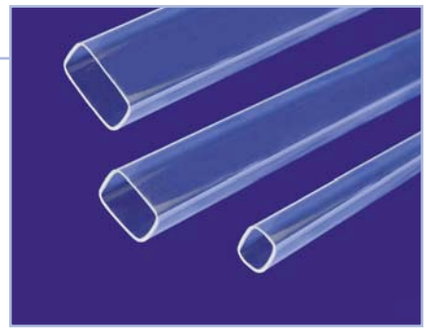
Material Capabilities

PTFE *also with fillers
FEP
PFA
ETFE
ECTFE
THV
MFA
PVDF
PEEK™

PEI ULTEM®
PE
***PTFE Fillers**
Glass Fiber
Carbon Black
Carbon Filler
Carbon Fiber
Metallic Fillers

Molybdenum Disulfide
Calcium Fluoride
Alumina (Ceramics)
Silica Fillers (Glass Beads)
Other Fillers
Radiopaque
Barium Sulfate
Bismuth Trioxide

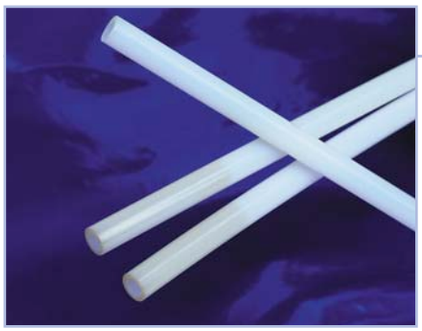
Production Capabilities



Single Tubing
Multilumen Tubing
Monofilament
Heat Shrinkable Tubing
Dual Shrink Tubing

Capillary Tubing
Pipe Liners
FEP/PE Coextrusions
Optical Fiber Tubing
Profiles & Shapes

Striped Tubing
Convoluted
Corrugated
Bellows
Wire Reinforced Tubing

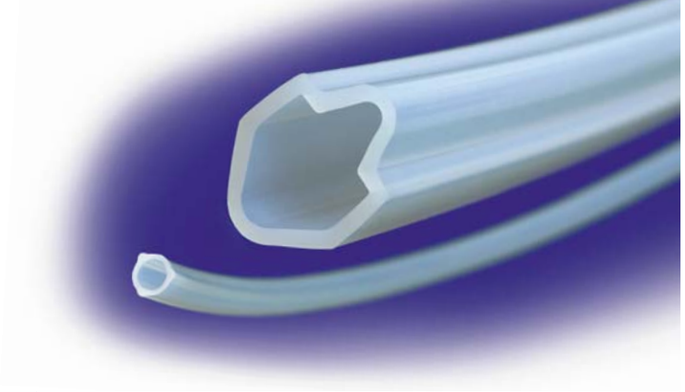


Value Added Capabilities

Etching
Hole Punching
Sealing
Bonding
Flaring
Flanging

Forming
Tube Slitting
Tube Scoring
Fittings
Design Assistance
Prototyping

Cut Pieces
Cleaning
Kits
Assemblies
Spiral Cutting



PTFE *(Polytetrafluoroethylene)*

Working Temperature: 500°F (260°C)
Color: Opaque to translucent, light blue tint, light brown tint

- Chemically Inert
- Lowest coefficient of friction
- Superior dielectric strength
- Exceptional heat resistance
- Self Extinguishing
- Nonwetting
- Excellent flexlife
- Laser markable

PFA *(Perfluoroalkoxy)*

Working Temperature: 500°F (260°C)
Color: Clear with light blue or light brown.

MFA *(Polytetrafluoroethylene-Perfluoromethylvinylether)*

Working Temperature: 500°F (260°C)
Color: Very Clear

- Excellent chemical resistance
- Exceptional heat resistance
- High light transmission
- Extremely smooth surface
- Long continuous lengths
- Smoother and clearer than PTFE
- Less permeable than PTFE
- Increased flex life over FEP

FEP *(Fluorinated Ethylene Propylene)*

Working Temperature: 400°F (204°C)
Color: Clear

- Excellent chemical resistance
- Nonwetting
- Weldable
- Tubes can be sealed by melting
- Long continuous lengths
- Low refractive index
- Improved clarity over PFA
- Lower cost alternative to PFA

ETFE *(Ethylene Tetrafluoroethylene)*

Working Temperature: 348°F (176°C)
Color: Translucent and Clear

- Increased mechanical strength
- Excellent chemical resistance
- Long continuous lengths
- Radiation resistant

USP CLASS VI & FDA COMPLIANT MATERIALS AVAILABLE

ECTFE *(Ethylene Chloro-trifluoroethylene)*

Working Temperature: 325°F (162°C)
Color: White with brown tint

- Excellent chemical resistance
- Nylon-like durability
- Excellent impact resistance
- Nonwetting
- Exceptional permeation resistance (10 to 100 times better than PTFE or FEP)

PVDF *(Polyvinylidene fluoride)*

Working Temperature: 265°F (130°C)
Color: Varies

- Very good chemical resistance
- Excellent resistance to creep and fatigue
- UV resistant
- Weldable
- Exceptional corrosion resistance for chlorine, fluorine, or bromine environments.

THV *(Tetrafluoroethylene hexafluoropropylene vinylidene fluoride)*

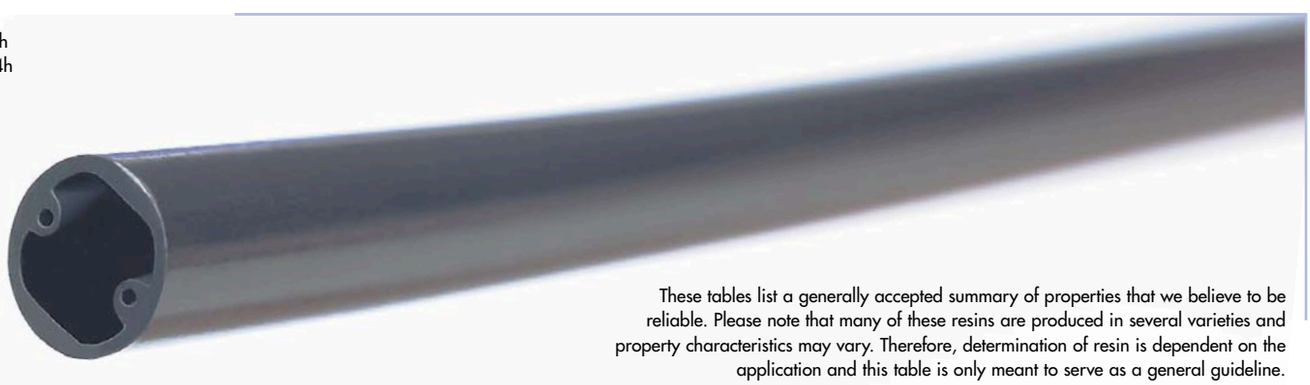
Working Temperature: 250°F (121°C)
Color: Transparent

- Permits bondability to other substrates without surface treatment
- Wettable
- Exceptional optical clarity
- Low refractive index
- Excellent chemical resistance
- Unmatched flexibility for melt processable fluoroplastics
- Excellent permeation resistance

Fluoroplastics

Properties	ASTM	UNIT	PTFE	FEP	PFA	ETFE	ECTFE	PVDF	MFA	THV
Mechanical Properties										
Specific Gravity	D792		2.13-2.20	2.12-2.17	2.12-2.17	1.70-1.76	1.68	1.76-1.78	2.12-2.17	195-198
Elongation	D638	%	200-450	250-330	280-400	420-460	200-300	300-450	300-360	500-600
Tensile Strength	D638	psi	2000-7000	2800-5000	4000-4500	6100-6800	6600-7800	4500-6200	3500-4400	2900-4060
Flexural Strength	D790	psi	no break	no break	no break	5500	7000	8600-9500	na	30,400
Compressive Strength	D695	psi	3500	2200		2500	1276-1711	11,600	2200	1800
Tensile Elastic Modulus (Young's Modulus)	D638	psi	57,000	50,000	72,500-87,000	85,000-95,000	240,000	160,000	65,000-78,000	30,000
Flexural Modulus	D790	psi	71,000-85,000	78,000-92,000	94,000-99,000	128,000-171,000	240,000	90,000-168,000	95,000	12,000-30,000
Flex Life	D2176	MIT cycles	>1,000,000	5000-80,000	10,000-500,000	10,000-27,000	na	na	10,000-100,000	na
Hardness Durometer		Shore D	D50-65	D55	D55-D60	D75	D75-D90	D75-D85	D55-D60	D44-D54
Coefficient of Friction		(on steel)	0.02	0.05	0.2	0.06	0.19	0.4	0.2	na
Abrasion Resistance	Taber	1000 revs.	12	14-20	9-17	na	0.005	5-15	10-17	na
Impact Strength IZOD 72°F/23°C	D256	Notched ft/lbs/in	3	no break	no break	no break	no break	4	no break	no break
Thermal Properties										
Melting Point		°C (°F)	327 (621)	260 (500)	305 (582)	267 (512)	240 (464)	171 (340)	285 (545)	120 (248)
Upper Service Temp. (20,000h)		°C (°F)	260 (500)	204 (400)	260 (500)	176 (348)	150-170 (300-340)	130 (265)	260 (500)	121 (250)
Flammability		UL 94	V-0	V-0	V-0	V-0	V-0	V-0	V-0	V-0
Thermal Conductivity		BTU/hr/ft^2/°F/in	1.7	1.4	1.3	1.65	1.6	1.3	1.4	1.4
		Cal-cm/s-cm^2,°C	6 x 10^{-4}	6 x 10^{-4}	6 x 10^{-6}	5.7 x 10^{-4}	4.7-5.3 x 10^{-4}	3.0 x 10^{-4}	na	na
Linear Coefficient of Thermal Expansion	D696	10^{-5} °C	>11.6	8.3-10.5	13	13	na	4.2	11-12	na
Heat of Fusion		BTU/LB	29-37	11	13	20	na	na	25.6	na
Heat of Combustion		BTU/LB	2200	2200	2300	8100	na	na	6200	na
Low Temperature Embrittlement		°C (°F)	-268 (-450)	-268 (-450)	-268 (-450)	-100 (-148)	-76 (-105)	-62 (-80)	-232 (-450)	na na
Electrical Properties										
Dielectric Constant	D150 D150	10^{3}Hz 10^{6}Hz	2.1 2.1	2.1 2.1	2.1 2.1	2.6 2.6	2.5 2.59	7.72 6.43	2.0 2.1	3.5 4.2
Dielectric Strength 10 mil film	D149	v/mil	≥1400	≥1400	≥1400	1600	na	>1080	2000	1400
Volume Resistivity	D257	ohm-cm	>10^{18}	>10^{18}	>10^{18}	>10^{16}	>10^{16}	2 x 10^{14}	>10^{17}	>10^{15}
Surface Resistivity	D257	ohm/sq.	>10^{17}	>10^{17}	>10^{17}	>10^{15}	>10^{14}-10^{15}	5 x 10^{14}	>10^{17}	na
General Properties										
Chemical/Solvent Resistance	D543		Excellent	Excellent	Excellent	Excellent	Excellent	Very Good	Excellent	Excellent
Water Absorption, 24h	D570	%	< 0.01	< 0.01	< 0.03	< 0.03	< 0.1	< 0.04	< 0.03	< 0.01
Deformation Under Load	*D621 **D621	100°C 25°C	5.0 7.0	5.0 3.0	2.4 2.7	5.4 2.3	2.6 0.2	2.4 0.7	na na	na na
Refractive Index			1.35	1.338	1.34	1.40	1.447	1.42	na	1.35
Limiting Oxygen Index	D2863	%	>95	>95	>95	31	60	43	>95	>75
Properties	ASTM	UNIT	PTFE	FEP	PFA	ETFE	ECTFE	PVDF	MFA	THV

* 6.8 MPa (986 PSI), 24h
** 13.7 MPa (1987PSI), 24h



These tables list a generally accepted summary of properties that we believe to be reliable. Please note that many of these resins are produced in several varieties and property characteristics may vary. Therefore, determination of resin is dependent on the application and this table is only meant to serve as a general guideline.

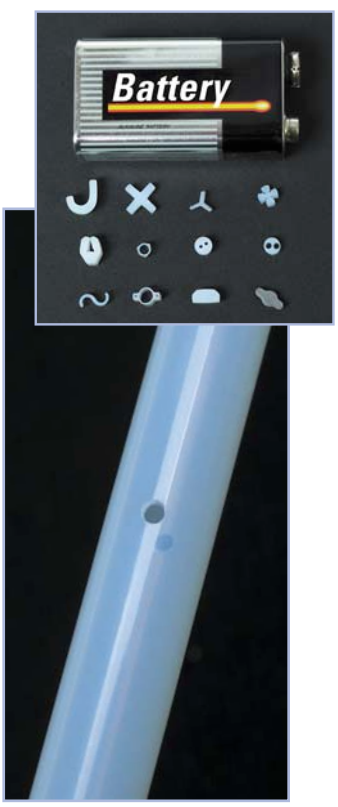
High Performance Thermoplastics

Properties	ASTM	UNIT	PEEK™	ULTEM®
Mechanical Properties				
Specific Gravity	D792		1.30-1.32	1.27-1.51
Elongation	D638	%	20-60	60
Tensile Strength	D638	psi	14,065-14,500	16,500
Flexural Strength		psi	24,650	20,000
Compressive Strength	D695		17,110	22,000
Tensile Elastic Modulus (Young's Modulus)	D638	psi	522,000	475,000
Flexural Modulus 103 MPa (103kgf/cm2)	D790		594,000	500,000
Hardness Durometer		Shore	D85-D86	M109
Coefficient of Friction	D1984	Static	0.24	na
Abrasion Resistance	Taber	1000 revs.	na	10
Impact Strength IZOD 73°F/23°C	D256	Notched ft/lbs/in	1.6	1.0
Thermal Properties				
Melting Point		°C (°F)	340 (644)	349 (660)
Upper Service Temp. (20,000h)		°C (°F)	260 (500)	200 (392)
Flammability		UL 94	V-0	V-0
Thermal Conductivity	C177	BTU-in/hr.ft²°F	1.73	na
		Watts/m°C	na	0.22
Linear Coefficient of Thermal Expansion		10^{-5} °F^{-1}	2.6	3.1
Heat Distortion		°C (°F)	152 (306)	na na
Electrical Properties				
Dielectric Constant	D150	50HZ-10kHZ	3.20-3.30	3.15
Dielectric Strength 10 mil		v/mil	>500	na
Volume Resistivity	D257	ohm-cm	4.9 x 10^{16}	6.7 x 10^{16}
Surface Resistivity		ohm/sq.	2.0 x 10^{16}	na
General Properties				
Chemical/Solvent Resistance			Excellent	Good
Water Absorption, 24h	D570	%	0.5	0.25
Refractive Index			na	1.46
Limiting Oxygen Index	D2863	%	24	47
Poisson's Ratio	D638		0.4	.36
Properties	ASTM	UNIT	PEEK™	ULTEM®

TexLoc Advantages:

- Precision Tolerance Tubing
- Customized Product Design and Development
- Application Engineering Services (AES)
- Early Project Involvement
- Rapid Response to R & D
- Product Traceability
- Wide Range of Class VI Materials including PTFE, FEP, PFA, ETFE, ECTFE, MFA, THV, Polyolefin, Peek™ and ULTEM®

TEXLOC™
PRECISION FLUOROPLASTIC TUBING



PEEK™ *(Polyetheretherketone)*

Working Temperature: 500°F (260°C)
Color: Light Tan

- Excellent steam resistance
- Excellent chemical resistance
- Excellent strength to weight ratio
- Outstanding wear resistance
- Excellent outgassing characteristics
- Self extinguishing
- Exceptional tensile strength

PEI ULTEM® *(Polyetherimide)*

Working Temperature: 392°F (200°C)
Color: Transparent amber to opaque color

- Excellent steam resistance
- Excellent chemical resistance
- UV & Gamma resistant
- Exceptional tensile strength

HEAVY WALL TUBING — PTFE, FEP & PFA

SIZE				WALL THICKNESS				APPX. WEIGHT	
INSIDE DIAMETER		OUTSIDE DIAMETER							
INCH	MM	INCH	MM	INCHES	+ or -	MM	+ or -	LB/FT	KG/M
1/32	.79	1/16	1.58	.015	.003	.381	.076	.0028	.0042
1/32	.79	3/32	2.38	.030	.005	.762	.127	.0075	.0112
1/16	1.58	1/8	3.18	.030	.005	.762	.127	.0108	.0161
3/32	2.38	5/32	3.97	.030	.005	.762	.127	.0151	.0225
1/8	3.18	3/16	4.76	.030	.005	.762	.127	.0182	.0271
3/16	4.76	1/4	6.35	.030	.005	.762	.127	.0252	.0375
1/4	6.35	5/16	7.94	.030	.005	.762	.127	.0336	.0499
5/16	7.94	3/8	9.53	.030	.005	.762	.127	.0396	.0589
3/8	9.53	7/16	11.11	.030	.005	.762	.127	.0469	.0698
7/16	11.11	1/2	12.70	.030	.005	.762	.127	.0542	.0806
1/2	12.70	9/16	14.29	.030	.005	.762	.127	.0614	.0914
9/16	14.29	5/8	15.88	.030	.007	.762	.178	.0686	.1020
5/8	15.88	11/16	17.46	.030	.007	.762	.178	.0771	.1147
11/16	17.46	3/4	19.05	.030	.007	.762	.178	.0830	.1235
3/4	19.05	.830	21.08	.040	.007	1.020	.178	.1220	.1815
7/8	22.23	.965	24.51	.045	.007	1.140	.178	.1615	.2403
1	25.40	1.100	27.94	.045	.007	1.140	.178	.1815	.2701
1 1/8	28.58	1.215	30.86	.045	.007	1.140	.178	.2032	.3023
1 1/4	31.75	1.340	34.04	.045	.007	1.140	.178	.2250	.3348
1 1/2	38.10	1.600	40.64	.050	.007	1.270	.178	.2992	.4452
2	50.80	2.100	53.34	.050	.010	1.270	.254	.3957	.5888

STANDARD O.D. SIZES

OUTSIDE DIAMETER		INSIDE DIAMETER		WALL THICKNESS				APPX. WEIGHT	
INCH	MM	INCH	MM	INCHES	+ or -	MM	+ or -	LB/FT	KG/M
1/4	6.35	.170	4.32	.040	.003	1.020	.076	.0324	.0482
1/4	6.35	.156	3.96	.047	.003	1.194	.076	.0368	.0548
3/8	9.53	.295	7.49	.040	.005	1.020	.127	.0517	.0769
1/2	12.70	.420	10.67	.040	.006	1.020	.152	.0710	.1056

EXTRA HEAVY WALL TUBING — PTFE, FEP & PFA

SIZE				WALL THICKNESS				APPX. WEIGHT	
INSIDE DIAMETER		OUTSIDE DIAMETER							
INCH	MM	INCH	MM	INCHES	+ or -	MM	+ or -	LB/FT	KG/M
1/8	3.18	1/4	6.35	.062	.008	1.57	.203	.045	.067
3/16	4.76	5/16	7.94	.062	.008	1.57	.203	.063	.094
1/4	6.35	3/8	9.53	.062	.008	1.57	.203	.075	.112
5/16	7.94	7/16	11.11	.062	.008	1.57	.203	.091	.135
3/8	9.53	1/2	12.70	.062	.008	1.57	.203	.106	.158
7/16	11.11	9/16	14.29	.062	.008	1.57	.203	.121	.180
1/2	12.70	5/8	15.88	.062	.008	1.57	.203	.136	.202
9/16	14.29	11/16	17.46	.062	.008	1.57	.203	.151	.225
5/8	15.88	3/4	19.05	.062	.008	1.57	.203	.166	.247
11/16	17.46	13/16	20.64	.062	.008	1.57	.203	.181	.269
3/4	19.05	7/8	22.23	.062	.008	1.57	.203	.194	.289
13/16	20.64	15/16	23.81	.062	.008	1.57	.203	.211	.314
7/8	22.23	1.0	25.40	.062	.008	1.57	.203	.228	.339
1	25.40	1 1/8	28.58	.062	.008	1.57	.203	.275	.409
1 1/4	31.75	1 3/8	34.93	.062	.008	1.57	.203	.317	.472
1 1/2	38.10	1 5/8	41.28	.062	.008	1.57	.203	.377	.561
2	50.80	2 1/8	53.98	.062	.008	1.57	.203	.494	.735
2.376	60.35	2 1/2	63.50	.062	.008	1.57	.203	.584	.868
2.876	73.05	3	76.20	.062	.008	1.57	.203	.703	1.046
3.860	98.04	4	101.60	.070	.008	1.78	.203	1.062	1.580

PTFE

Meets Specifications:	ASTM-D3295	Dielectric Strength: ≥1400 V/M*
Continuous Use Temperature Range:	-100 to 500°F -075 to 260°C	Color: Natural *Per ASTM D 149 Short Term Test of 10 MIL Thickness, (Volts/Mil)

FEP

Meets Specifications:	L-P-387A SPI-FD-111	Dielectric Strength: ≥1400 V/M*
Continuous Use Temperature Range:	-100 to 400°F -075 to 204°C	Color: Natural *Per ASTM D 149 Short Term Test of 10 MIL Thickness, (Volts/Mil)

PFA

Continuous Use Temperature Range:	-100 to 500°F -075 to 260°C	Dielectric Strength: ≥1400 V/M* Color: Natural *Per ASTM D 149 Short Term Test of 10 MIL Thickness, (Volts/Mil)

Design Prototyping

• • • •

Application Engineering Services (AES)

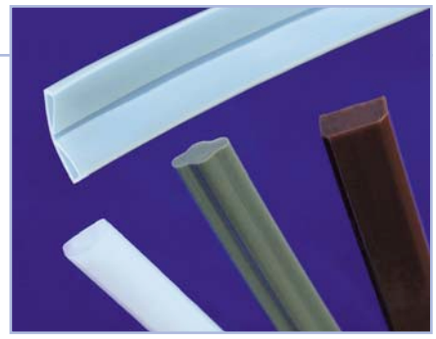
Additional Services

On-Site Material Science Services

Failure & Resin Analysis
Differential Scanning Calorimeter (DSC)
Instron (Tensile & Elongation Testing)
Specific Gravity Index
Extrusion Plastometer (Melt Flow Index)
Application Engineering Services (AES)
Microscopy
Goniometer (Contact Angle Tester)
Laser Micrometers
Ultrasonics
Vacuum Pressure Testing
Class 10,000 Clean room
SPC Retention

Certifications

USP Class VI Certifications
Mil Spec Certifications
Material Certifications



Key Benefits

- *Shortest Deliveries in the Industry*
- *Large In-Stock Inventories*
- *Diversity of Materials, Processes and Sizes*
- *Individualized Service*
- *In-House Value Added Department*
- *Free Engineering Assistance*
- *On-Site Testing*

— Typical Applications —

• Wire & Cable • Paint System Linings
• Fluid Transfer Systems • Hoses • Electrical Insulation
• Harnesses • Heat Exchangers • Pump Bladders
• Exit Tubes • Electrical Conduit • Hose & Chafe Guards
• Products For Wet Bench OEMs, CMP Systems, PVD and CVD

——— Markets ———

• Environmental and Water Sampling
• Automotive and Marine • Chemical Processing
• Food and Beverage • Petroleum
• Medical & Pharmaceutical • Semiconductor
• Aerospace • Electronics

Size Capabilities

Smooth Bore Tubing
.002″ ID – 7″ ID
.001″ Wall - .200″ Wall
Heat Shrinkable Tubing
.011″ Expanded ID up to 12″ Expanded ID
Convoluted Tubing
1/8″ ID – 4″ ID
Corrugated Tubing
3/16″ ID – 2 1/2″ ID

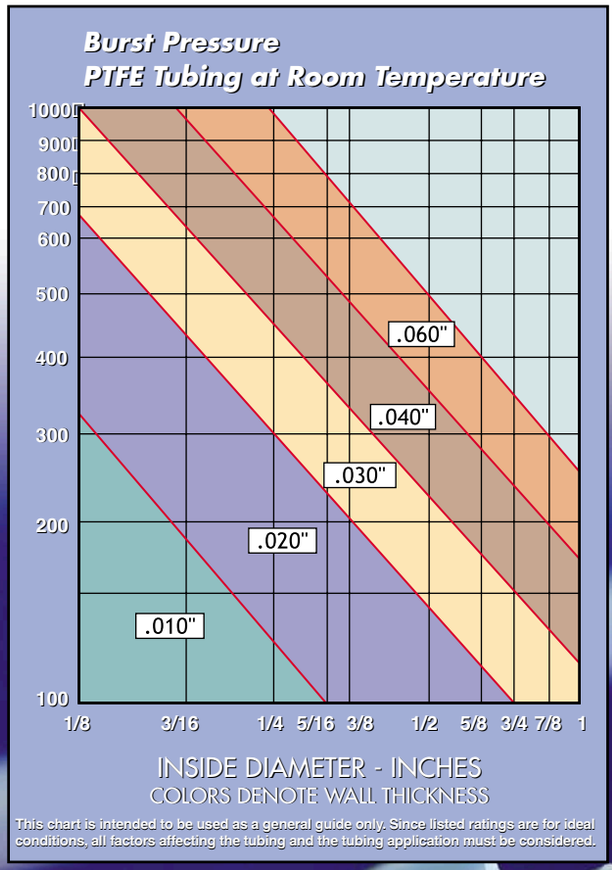
Special Sizes Quoted Upon Request

Custom Sizes Available On Request

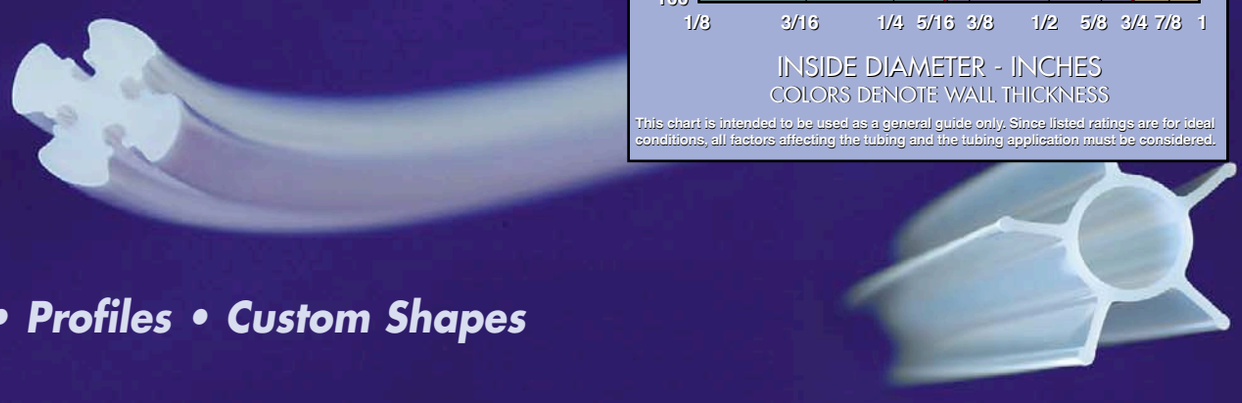
• • • •

Diversity in Product, Size and Material

BURST AT ROOM TEMPERATURE

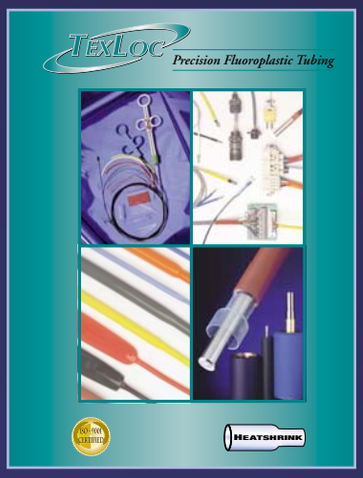


This chart is intended to be used as a general guide only. Since listed ratings are for ideal conditions, all factors affecting the tubing and the tubing application must be considered.



Jacketing • Profiles • Custom Shapes

Available Literature On Other Fine TexLoc™ Products...



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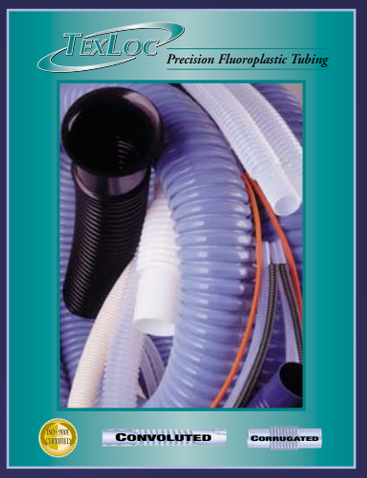

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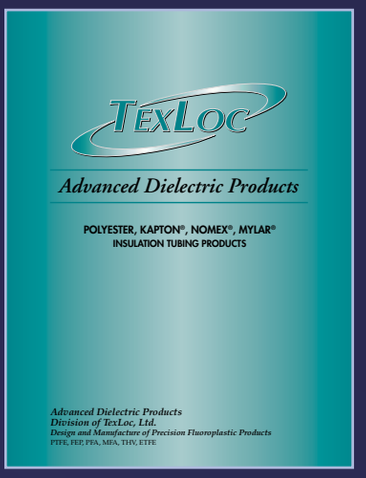

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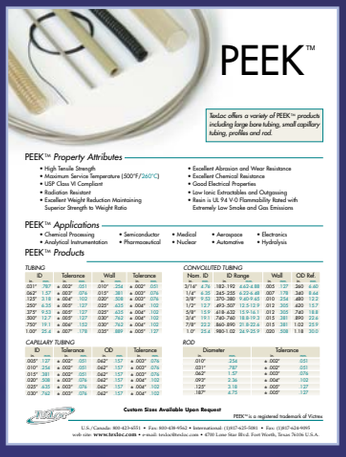

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