



Fluoropolymer Tubing

Fluoropolymer

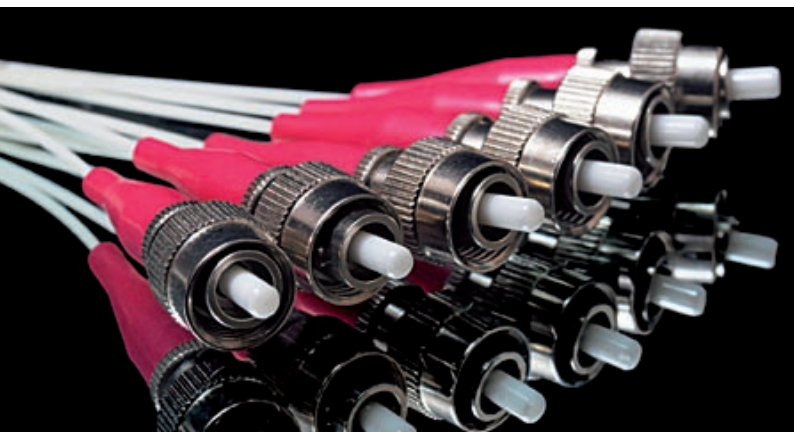
Fluoropolymer Tubing in Industry



Mechanical

Fluoropolymer resins have extremely low coefficients of friction and low surface energy giving them their well known 'non-stick' surfaces. Filled resins can be utilised to increase abrasion resistance. Fluoropolymers retain their mechanical properties across a broad range of temperatures.

Applications include ■ 'Push-pull' and radial control cables
■ tape cassette guide posts ■ permanent (greaseless) bearings ■ heat shields ■ roll covers.



Electrical

All types of fluoropolymer tubing have extremely high dielectric values making them ideal where high performance insulation is required.

Applications include ■ Connector & terminal sleeves ■ cable bundles with spiral cut tubing ■ insulation where resistance to heat is required ■ micro-miniature wire insulation ■ coaxial cable cores, solid and splined.



Medical

The characteristics of fluoropolymer tubing make them ideal for medical applications. They are non-toxic, hypoallergenic & and bio-compatible. They feature low water absorption, are easily sterilised and adaptable to medical equipment, instruments and appliances. Natural and radio-opaque extrusions and tubing with various fillers are optional.

Applications include ■ Catheters for intravenous, angiography & biopsy applications ■ tubes for dialysis ■ shunts ■ connectors ■ pipettes.

Note: Medical applications require special attention to purity of resin, cleanliness of production, smoothness, tolerance and packaging. Always specify 'Medical Application' when requesting information.



Water, food and beverage

Many of the properties that make fluoropolymer tubing suitable for medical and chemical applications also apply to the food & beverage industry.

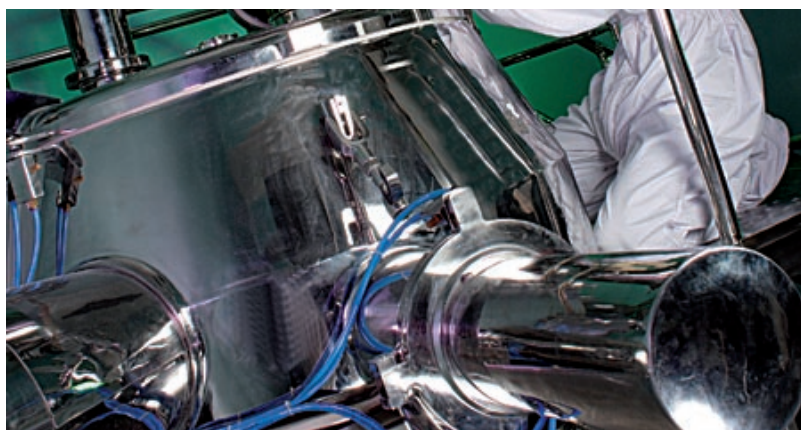
Applications include ■ Transfer of pure water and fluids ■ sterilisable tubing and hoses ■ transfer of water and liquids for UV sterilisation and ozonation ■ transfer and dosing of disinfectants and ph controllers (e.g. sodium hypochlorite).



Optical

The clarity and refractive index of some fluoropolymers, eg, FEP, makes them highly suitable for a number of optical applications.

Applications include ■ Casings and over-extrusions for plastic optical fibres for architectural lighting ■ light conduits in explosive or highly flammable atmospheres ■ fluorescent tube coverings.



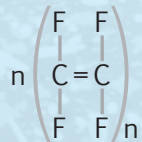
Chemical

Fluoropolymers are chemically inert and solvent resistant making them ideal for many applications within the chemical industry and in laboratory work. They also maintain integrity at both low and high temperatures. Furthermore, their low level of extractables means that they will not contaminate fluids or gases flowing through them.

Applications include ■ Transfer hoses for corrosive & cryogenic liquids ■ heat exchanger tubing for high temperature corrosive liquids ■ steam hoses ■ sight glasses and tubes ■ laboratory plumbing ■ paint and adhesive transfer ■ sampling and control ■ automotive and aerospace hydraulic fluids and fuels ■ air & water sampling ■ deionised water transfer.



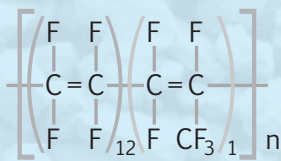
Basic Properties of Fluoropolymers



Polytetrafluoroethylene (PTFE)

Polytetrafluoroethylene (PTFE)

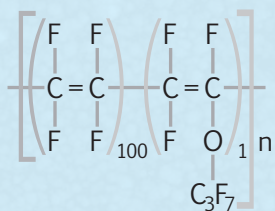
PTFE (C₂F₄)_n is a fully fluorinated polymer, the chemical structure of which resembles polyethylene. It has a very high molecular weight in the range of one to five million. It cannot be melt processed. It is supplied in a powdered form which is mixed with solvent and compressed into a preform. The preform can be ram-extruded into a variety of profiles including tubing. The process is known as paste extrusion. The extrudate is passed through ovens where it is dried and sintered. The finished product is translucent in colour.



Fluorinated ethylenepropylene (FEP)

Fluorinated Ethylene Propylene (FEP)

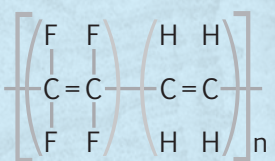
FEP is a copolymer of tetrafluoroethylene and hexafluoropropylene. It is a fully fluorinated polymer like PTFE but it has a lower molecular weight which allows it to be melt processed on standard extrusion equipment. FEP tubing is more flexible than PTFE. It has higher gas and vapour permeability and has greater translucency to visible light and UV radiation. Its temperature and chemical resistance is slightly inferior to PTFE but is still outstanding compared to most polymers.



Perfluoroalkoxy (PFA)

Perfluoroalkoxy (PFA)

PFA is a copolymer of tetrafluoroethylene and perfluoroalkoxy vinyl ether. Unlike PTFE and FEP, PFA is not fully fluorinated containing oxygen in its polymer chain. It can be melt processed like FEP and has outstanding temperature and chemical resistance approaching that of PTFE. PFA has a higher continuous service temperature than FEP. It has gas and vapour permeability similar to FEP and similar UV translucency. It has a smoother finish than FEP. It is clearer and more flexible than PTFE.



Ethylene tetrafluoroethylene (ETFE)

Ethylene Tetrafluoroethylene (ETFE)

ETFE is a copolymer of ethylene and tetrafluoroethylene with commercial grades containing around 75% of tetra-fluoroethylene by weight. ETFE is melt processible and has superior impact resistance, durability, stiffness, tensile & hoop strength than the aforementioned fluoropolymers. However, due to the presence of the ethylene monomer the resistance of ETFE to temperature and chemicals, although high, is not as high as PTFE, FEP or PFA. More commonly used for cable jacketing and injection moulded parts, ETFE can be extruded as tubing.

Fluoropolymers' Properties Comparison



	ASTM Standard	Units	PTFE	FEP	PFA	ETFE
Specific gravity	D792	g/cm ³	2.15	2.15	2.15	1.71
Tensile strength	D638	MPa	24.5	31	31	44.8
Ultimate elongation	D638	%	350	305	300	275
Flexural modulus	D790	MPa	490	586	690	1,373
Flex life	MIT (0.2mm, 180° flex)		750,000	80,000	200,000	30,000
Impact strength	D256 (+23°C)	J/m	No break			
	D256 (-54°C)	J/m	107	155	155	>1,100
Hardness	D2240	Shore D	55	57	60	75
Coefficient of friction	D1894	<3m/min	0.1	0.2	0.2	0.4
Melting point		C°	327	260	305	270
Service temperature (20,000 hrs)		C°	260	205	260	155
Inflammability	UL-94		94 V-0	94 V-0	94 V-0	94 V-0
Limiting oxygen index	D2863	%	>95	>95	>95	>30
Heat of combustion	D240	MJ/kg	5.0	5.0	~5.0	13.8

Mechanical Properties

	ASTM Standard	Units	PTFE	FEP	PFA	ETFE
Dielectric constant at 10 ³ – 10 ⁶ Hz	D150		2.1	2.1	2.1	2.6
Dissipation factor at 10 ⁶ Hz	D150		0.0002	0.0007	0.0002	0.005
Arc resistance	D495	Sec	>300	>300	>180	72
Volume resistivity	D257	Ω cm	>10 ¹⁸	>10 ¹⁶	>10 ¹⁷	>10 ¹⁶
Surface resistivity	D257	Ω	>10 ¹⁶	>10 ¹⁶	>10 ¹⁷	>10 ¹⁴

Electrical Properties

	ASTM Standard	Units	PTFE	FEP	PFA	ETFE
Weather resistance	'Weather -O-meter'	2,000hr	No break			
Chemical/solvent resistance	D543		Excellent	Excellent	Excellent	V. good
Water absorption - 24hrs	D570	%	<0.01	<0.01	<0.03	<0.007

General Properties

PTFE, FEP, PFA, ETFE Extruded Tubing – AWG

Metric

AWG Size	Inside diameter			Wall dimensions					
				Standard wall		Thin wall		Lightweight wall	
	minimum mm	nominal mm	maximum mm	nominal mm	tolerance mm	nominal mm	tolerance mm	nominal mm	tolerance mm
32	0.20	0.25	0.30	0.13	±0.05	0.13	±0.05	-	-
30	0.25	0.30	0.38	0.23	±0.05	0.23	±0.05	0.15	±0.05
28	0.33	0.38	0.46	0.23	±0.05	0.23	±0.05	0.15	±0.05
26	0.41	0.46	0.53	0.23	±0.05	0.23	±0.05	0.15	±0.05
24	0.51	0.56	0.66	0.30	±0.05	0.25	±0.08	0.15	±0.05
23	0.58	0.66	0.74	0.30	±0.05	0.25	±0.08	0.15	±0.05
22	0.64	0.71	0.81	0.30	±0.05	0.25	±0.08	0.15	±0.05
21	0.74	0.81	0.89	0.30	±0.05	0.25	±0.08	0.15	±0.05
20	0.81	0.86	0.97	0.41	±0.08	0.30	±0.08	0.15	±0.05
19	0.91	0.97	1.07	0.41	±0.08	0.30	±0.08	0.15	±0.05
18	1.02	1.07	1.17	0.41	±0.08	0.30	±0.08	0.15	±0.05
17	1.14	1.19	1.32	0.41	±0.08	0.30	±0.08	0.15	±0.05
16	1.30	1.35	1.47	0.41	±0.08	0.30	±0.08	0.15	±0.05
15	1.45	1.50	1.65	0.41	±0.08	0.30	±0.08	0.15	±0.05
14	1.63	1.68	1.83	0.41	±0.08	0.30	±0.08	0.20	±0.05
13	1.83	1.93	2.06	0.41	±0.08	0.30	±0.08	0.20	±0.05
12	2.06	2.16	2.31	0.41	±0.08	0.30	±0.08	0.20	±0.05
11	2.31	2.41	2.57	0.41	±0.08	0.30	±0.08	0.20	±0.05
10	2.59	2.69	2.84	0.41	±0.08	0.30	±0.08	0.20	±0.05
9	2.90	3.00	3.15	0.51	±0.10	0.38	±0.08	0.20	±0.05
8	3.28	3.38	3.53	0.51	±0.10	0.38	±0.08	0.20	±0.05
7	3.66	3.76	3.94	0.51	±0.10	0.38	±0.08	0.20	±0.05
6	4.11	4.22	4.42	0.51	±0.10	0.38	±0.08	0.25	±0.08
5	4.62	4.72	4.95	0.51	±0.10	0.38	±0.08	0.25	±0.08
4	5.18	5.28	5.54	0.51	±0.10	0.38	±0.08	0.25	±0.08
3	5.82	5.94	6.20	0.51	±0.10	0.38	±0.08	0.25	±0.08
2	6.55	6.68	6.93	0.51	±0.10	0.38	±0.08	0.25	±0.08
1	7.34	7.47	7.75	0.51	±0.10	0.38	±0.08	0.25	±0.08
0	8.26	8.38	8.69	0.51	±0.10	0.38	±0.08	0.30	±0.08

Unasco thin wall tubing fills the size gap between the industry standard (AMS 3653) and lightweight wall (AMS 3654). It is intended to allow specification of the most economical as well as the most effective tubing size. In applications where heretofore lightweight wall was used simply because standard was too heavy.

Unasco thin wall may fit perfectly and at a considerable saving in cost. Thin wall tubing naturally enjoys the same physical properties as standard & lightweight tubing.

Unasco micro thin tubing – approximately half the weight and wall thickness of standard tubing – is available on special order. Contact our sales office for more information.

Packaging details are on page 17

Meets or exceeds the following specifications where applicable:

TFE SW – ASTM D 3295, AMS 3653, MIL-I-22129

TFE TW – ASTM D 3295, AMS 3655

TFE LW – ASTM D 3295, AMS 3654

FEP SW – ASTM D 3296, L-P-389

FEP LW – ASTM D 3296, L-P-389.

UL compliant tubing available on request.

In all cases military or commercial specifications, latest revisions apply.

Supplied in natural unless otherwise specified.

Custom Pantone colours and sizes available on request.

polymer



AWG Size	Inside diameter			Wall dimensions					
				Standard wall		Thin wall		Lightweight wall	
	minimum <i>in.</i>	nominal <i>in.</i>	maximum <i>in.</i>	nominal <i>in.</i>	tolerance <i>in.</i>	nominal <i>in.</i>	tolerance <i>in.</i>	nominal <i>in.</i>	tolerance <i>in.</i>
32	0.008	0.010	0.012	0.005	±0.002	0.005	±0.002	-	-
30	0.010	0.012	0.015	0.009	±0.002	0.009	±0.002	0.006	±0.002
28	0.013	0.015	0.018	0.009	±0.002	0.009	±0.002	0.006	±0.002
26	0.016	0.018	0.021	0.009	±0.002	0.009	±0.002	0.006	±0.002
24	0.020	0.022	0.026	0.012	±0.002	0.010	±0.003	0.006	±0.002
23	0.023	0.026	0.029	0.012	±0.002	0.010	±0.003	0.006	±0.002
22	0.025	0.028	0.032	0.012	±0.002	0.010	±0.003	0.006	±0.002
21	0.029	0.032	0.035	0.012	±0.002	0.010	±0.003	0.006	±0.002
20	0.032	0.034	0.038	0.016	±0.003	0.012	±0.003	0.006	±0.002
19	0.036	0.038	0.042	0.016	±0.003	0.012	±0.003	0.006	±0.002
18	0.040	0.042	0.046	0.016	±0.003	0.012	±0.003	0.006	±0.002
17	0.045	0.047	0.052	0.016	±0.003	0.012	±0.003	0.006	±0.002
16	0.051	0.053	0.058	0.016	±0.003	0.012	±0.003	0.006	±0.002
15	0.057	0.059	0.065	0.016	±0.003	0.012	±0.003	0.006	±0.002
14	0.064	0.066	0.072	0.016	±0.003	0.012	±0.003	0.008	±0.002
13	0.072	0.076	0.081	0.016	±0.003	0.012	±0.003	0.008	±0.002
12	0.081	0.085	0.091	0.016	±0.003	0.012	±0.003	0.008	±0.002
11	0.091	0.095	0.101	0.016	±0.003	0.012	±0.003	0.008	±0.002
10	0.102	0.106	0.112	0.016	±0.003	0.012	±0.003	0.008	±0.002
9	0.114	0.118	0.124	0.020	±0.004	0.015	±0.003	0.008	±0.002
8	0.129	0.133	0.139	0.020	±0.004	0.015	±0.003	0.008	±0.002
7	0.144	0.148	0.155	0.020	±0.004	0.015	±0.003	0.008	±0.002
6	0.162	0.166	0.174	0.020	±0.004	0.015	±0.003	0.010	±0.003
5	0.182	0.186	0.195	0.020	±0.004	0.015	±0.003	0.010	±0.003
4	0.204	0.208	0.218	0.020	±0.004	0.015	±0.003	0.010	±0.003
3	0.229	0.234	0.244	0.020	±0.004	0.015	±0.003	0.010	±0.003
2	0.258	0.263	0.273	0.020	±0.004	0.015	±0.003	0.010	±0.003
1	0.289	0.294	0.305	0.020	±0.004	0.015	±0.003	0.010	±0.003
0	0.325	0.330	0.342	0.020	±0.004	0.015	±0.003	0.012	±0.003

Imperial

PTFE, FEP, PFA, ETFE Extruded Tubing – AWG *CONTINUED*

Metric

Size	Inside diameter			Wall dimensions	
	minimum <i>mm</i>	nominal <i>mm</i>	maximum <i>mm</i>	nominal <i>mm</i>	tolerance <i>mm</i>
24	0.51	0.56	0.66	0.41	±0.076
23	0.61	0.69	0.76	0.41	±0.076
22	0.64	0.72	0.81	0.41	±0.076
21	0.76	0.84	0.91	0.41	±0.076
20	0.81	0.91	1.02	0.46	±0.076
19	0.91	1.02	1.12	0.51	±0.102
18	1.02	1.13	1.24	0.51	±0.102
17	1.14	1.26	1.37	0.51	±0.102
16	1.30	1.42	1.55	0.51	±0.102
15	1.45	1.57	1.70	0.51	±0.102
14	1.63	1.75	1.88	0.51	±0.102
13	1.83	1.96	2.08	0.51	±0.102
12	2.06	2.18	2.31	0.51	±0.102
11	2.31	2.44	2.57	0.51	±0.102
10	2.59	2.72	2.84	0.64	±0.127
9	2.90	3.02	3.15	0.64	±0.127
8	3.28	3.43	3.58	0.76	±0.127
7	3.66	3.84	4.01	0.76	±0.127
6	4.11	4.32	4.52	0.76	±0.127
5	4.62	4.83	5.03	0.81	±0.127

Packaging details
are on page 17

Meets or exceeds the following specifications where applicable:

TFE SW – ASTM D 3295, AMS 3653, MIL-I-22129

TFE TW – ASTM D 3295, AMS 3655

TFE LW – ASTM D 3295, AMS 3654

FEP SW – ASTM D 3296

FEP LW – ASTM D 3296.

UL compliant tubing available on request.

In all cases military or commercial specifications, latest revisions apply.

Supplied in natural unless otherwise specified.

Custom Pantone colours and sizes available on request.

polymer



Size	Inside diameter			Wall dimensions	
	minimum <i>in.</i>	nominal <i>in.</i>	maximum <i>in.</i>	nominal <i>in.</i>	tolerance <i>in.</i>
24	0.020	0.022	0.026	0.016	±0.003
23	0.024	0.027	0.030	0.016	±0.003
22	0.025	0.0285	0.032	0.016	±0.003
21	0.030	0.033	0.036	0.016	±0.003
20	0.032	0.036	0.040	0.018	±0.003
19	0.036	0.040	0.044	0.020	±0.004
18	0.040	0.0445	0.049	0.020	±0.004
17	0.045	0.0495	0.054	0.020	±0.004
16	0.051	0.056	0.061	0.020	±0.004
15	0.057	0.062	0.067	0.020	±0.004
14	0.064	0.069	0.074	0.020	±0.004
13	0.072	0.077	0.082	0.020	±0.004
12	0.081	0.086	0.091	0.020	±0.004
11	0.091	0.096	0.101	0.020	±0.004
10	0.102	0.107	0.112	0.025	±0.005
9	0.114	0.119	0.124	0.025	±0.005
8	0.129	0.135	0.141	0.030	±0.005
7	0.144	0.151	0.158	0.030	±0.005
6	0.162	0.170	0.178	0.030	±0.005
5	0.182	0.190	0.198	0.032	±0.005

Imperial

PTFE, FEP, PFA, ETFE – Extruded Metric Tubing

0.5mm Wall	Ordering Size	I.D.	Tolerance	Wall
	(ID/OD)		±	Thickness
	<i>mm</i>	<i>mm</i>	<i>mm</i>	<i>mm</i>
	0.50/1.50	0.50	0.05	0.50±0.07
	1.00/2.00	1.00	0.05	0.50±0.07
	1.50/2.50	1.50	0.10	0.50±0.07
	2.00/3.00	2.00	0.10	0.50±0.07
	2.50/3.50	2.50	0.15	0.50±0.07
	3.00/4.00	3.00	0.15	0.50±0.07
	3.50/4.50	3.50	0.15	0.50±0.07
	4.00/5.00	4.00	0.15	0.50±0.07
	4.50/5.50	4.50	0.20	0.50±0.07
	5.00/6.00	5.00	0.20	0.50±0.07
	5.50/6.50	5.50	0.20	0.50±0.07
	6.00/7.00	6.00	0.20	0.50±0.07
	6.50/7.50	6.50	0.20	0.50±0.07
	7.00/8.00	7.00	0.20	0.50±0.07
	7.50/8.50	7.50	0.20	0.50±0.07
	8.00/9.00	8.00	0.20	0.50±0.07
	8.50/9.50	8.50	0.30	0.50±0.07
	9.00/10.00	9.00	0.30	0.50±0.07
	12.00/13.00	12.00	0.30	0.50±0.07
	13.00/14.00	13.00	0.50	0.50±0.07

Packaging details
are on page 17

On all cases military or commercial specifications, latest revisions apply.
Supplied in natural unless otherwise specified. Custom Pantone colours available on request.

polymer



Ordering size (ID/OD) <i>mm</i>	I.D. <i>mm</i>	Tolerance ± <i>mm</i>	Wall Thickness <i>mm</i>
1.00/3.00	1.00	0.05	1.00±0.15
2.00/4.00	2.00	0.10	1.00±0.15
2.50/4.50	2.50	0.15	1.00±0.15
3.00/5.00	3.00	0.15	1.00±0.15
3.50/5.50	3.50	0.15	1.00±0.15
4.00/6.00	4.00	0.15	1.00±0.15
4.50/6.50	4.50	0.20	1.00±0.15
5.00/7.00	5.00	0.20	1.00±0.15
5.50/7.50	5.50	0.20	1.00±0.15
6.00/8.00	6.00	0.20	1.00±0.15
6.50/8.50	6.50	0.20	1.00±0.15
7.00/9.00	7.00	0.20	1.00±0.15
7.50/9.50	7.50	0.20	1.00±0.15
8.00/10.00	8.00	0.20	1.00±0.15
8.50/10.50	8.50	0.30	1.00±0.15
9.00/11.00	9.00	0.30	1.00±0.15
9.50/11.50	9.50	0.30	1.00±0.15
10.00/12.00	10.00	0.30	1.00±0.15
10.50/12.50	10.50	0.30	1.00±0.15
11.00/13.00	11.00	0.30	1.00±0.15
12.00/14.00	12.00	0.30	1.00±0.15
13.00/15.00	13.00	0.30	1.00±0.15
14.00/16.00	14.00	0.30	1.00±0.15
15.00/17.00	15.00	0.40	1.00±0.15
16.00/18.00	16.00	0.40	1.00±0.15
18.00/20.00	18.00	0.40	1.00±0.15
19.00/21.00	19.00	0.40	1.00±0.15
19.50/21.50	19.50	0.40	1.00±0.15

Ordering size (ID/OD) <i>mm</i>	I.D. <i>mm</i>	Tolerance ± <i>mm</i>	Wall Thickness <i>mm</i>
20.00/22.00	20.00	0.40	1.00±0.15
21.00/23.00	21.00	0.50	1.00±0.15
22.00/24.00	22.00	0.50	1.00±0.15
22.50/24.50	22.50	0.50	1.00±0.15
23.00/25.00	23.00	0.50	1.00±0.15
23.50/25.50	23.50	0.50	1.00±0.15
25.00/27.00	25.00	0.50	1.00±0.15
26.00/28.00	26.00	0.50	1.00±0.15
27.00/29.00	27.00	0.50	1.00±0.15
28.00/30.00	28.00	0.50	1.00±0.15
29.00/31.00	29.00	0.50	1.00±0.15
30.00/32.00	30.00	0.60	1.00±0.15
32.00/34.00	32.00	0.60	1.00±0.15
37.00/39.00	37.00	0.60	1.00±0.15
38.00/40.00	38.00	0.60	1.00±0.15
40.00/42.00	40.00	0.75	1.00±0.15
42.00/44.00	42.00	0.75	1.00±0.15
43.00/45.00	43.00	0.75	1.00±0.15
45.00/47.00	45.00	0.75	1.00±0.15
45.50/47.50	45.50	0.75	1.00±0.15
48.00/50.00	48.00	0.75	1.00±0.15
50.00/52.00	50.00	0.75	1.00±0.15

1.0mm
Wall

PTFE, FEP, PFA, ETFE
 – Extruded Metric Tubing *CONTINUED*

1.5mm
 and
 2.0mm
 Wall

1.5mm Wall Tubing			
Ordering size (ID/OD)	I.D.	Tolerance ±	Wall Thickness
mm	mm	mm	mm
1.50/4.50	1.50	0.10	1.50±0.20
2.00/5.00	2.00	0.15	1.50±0.20
3.00/6.00	3.00	0.15	1.50±0.20
5.00/8.00	5.00	0.20	1.50±0.20
6.00/9.00	6.00	0.20	1.50±0.20
10.00/13.00	10.00	0.30	1.50±0.20
12.00/15.00	12.00	0.30	1.50±0.20
13.00/16.00	13.00	0.30	1.50±0.20
14.00/17.00	14.00	0.30	1.50±0.20
16.00/19.00	16.00	0.40	1.50±0.20
18.00/21.00	18.00	0.40	1.50±0.20
19.00/22.00	19.00	0.40	1.50±0.20
20.00/23.00	20.00	0.50	1.50±0.20
21.00/24.00	21.00	0.50	1.50±0.20
22.00/25.00	22.00	0.50	1.50±0.20
25.00/28.00	25.00	0.50	1.50±0.20
28.00/31.00	28.00	0.50	1.50±0.20
29.00/32.00	29.00	0.50	1.50±0.20
30.00/33.00	30.00	0.60	1.50±0.20
40.00/43.00	40.00	0.75	1.50±0.20
49.00/52.00	49.00	0.75	1.50±0.20

Packaging details
 are on page 17

2.0mm Wall Tubing			
Ordering size (ID/OD)	I.D.	Tolerance ±	Wall Thickness
mm	mm	mm	mm
2.00/6.00	2.00	0.10	2.00±0.20
4.00/8.00	4.00	0.15	2.00±0.20
6.00/10.00	6.00	0.20	2.00±0.20
8.00/12.00	8.00	0.20	2.00±0.20
10.00/14.00	10.00	0.30	2.00±0.20
12.00/16.00	12.00	0.30	2.00±0.20
14.00/18.00	14.00	0.40	2.00±0.20
16.00/20.00	16.00	0.40	2.00±0.20
20.00/24.00	20.00	0.50	2.00±0.20
25.00/29.00	25.00	0.50	2.00±0.20
28.00/32.00	28.00	0.50	2.00±0.20
28.50/32.50	28.50	0.50	2.00±0.20
32.00/36.00	32.00	0.60	2.00±0.20
36.00/40.00	36.00	0.60	2.00±0.20
40.00/44.00	40.00	0.75	2.00±0.20
46.00/50.00	46.00	0.75	2.00±0.20



PTFE, FEP, PFA, ETFE
 – Heavy Construction Tubing

Fractional sizes Spec'd by O.D. <i>in.</i>	O.D. <i>mm</i>	I.D. <i>mm</i>	Nominal Wall <i>mm</i>
1/4	6.35±0.13	3.18±0.13	1.60
5/16	7.92±0.13	4.78±0.13	1.60
3/8	9.52±0.13	6.35±0.13	1.60
7/16	11.13±0.13	7.95±0.13	1.60
1/2	12.70±0.15	9.52±0.15	1.60
9/16	14.30±0.15	11.13±0.15	1.60
5/8	15.88±0.15	12.70±0.15	1.60
11/16	17.48±0.15	14.30±0.15	1.60
3/4	19.05±0.15	15.88±0.15	1.60
13/16	20.65±0.15	17.48±0.15	1.60
7/8	22.23±0.15	19.05±0.15	1.60
15/16	23.83±0.15	20.65±0.15	1.60
1	25.40±0.25	22.23±0.25	1.60

Metric

Fractional sizes Spec'd by O.D. <i>in.</i>	O.D. <i>in.</i>	I.D. <i>in.</i>	Nominal Wall <i>in.</i>
1/4	0.250±0.005	0.125±0.005	0.063
5/16	0.313±0.005	0.188±0.005	0.063
3/8	0.375±0.005	0.250±0.005	0.063
7/16	0.438±0.005	0.313±0.005	0.063
1/2	0.500±0.006	0.375±0.006	0.063
9/16	0.563±0.006	0.438±0.006	0.063
5/8	0.625±0.006	0.500±0.006	0.063
11/16	0.688±0.006	0.563±0.006	0.063
3/4	0.750±0.006	0.625±0.006	0.063
13/16	0.813±0.006	0.688±0.006	0.063
7/8	0.875±0.006	0.750±0.006	0.063
15/16	0.938±0.006	0.813±0.006	0.063
1	1.000±0.010	0.875±0.010	0.063

Imperial

Packaging details
 are on page 17.

PTFE, FEP, PFA, ETFE Extruded Tubing – Industrial Specification

Metric

Size	Inside diameter			Wall dimensions					
	minimum mm	nominal mm	maximum mm	Standard wall		Thin wall		Lightweight wall	
				nominal mm	tolerance mm	nominal mm	tolerance mm	nominal mm	tolerance mm
1/8	3.05	3.18	3.30	0.51	±0.10	0.38	±0.08	—	—
1/8	3.18	3.30	3.43	—	—	—	—	0.20	±0.05
3/16	4.78	4.88	5.03	0.51	±0.10	0.38	±0.08	0.25	±0.08
1/4	6.35	6.48	6.60	0.51	±0.10	0.38	±0.08	0.25	±0.08
5/16	7.95	8.15	8.43	0.51	±0.10	0.38	±0.08	0.30	±0.08
3/8	9.53	9.83	10.01	0.64	±0.13	0.38	±0.08	0.38	±0.13
7/16	11.13	11.46	11.63	0.64	±0.13	0.46	±0.10	0.46	±0.13
1/2	12.70	13.08	13.21	0.64	±0.13	0.46	±0.10	0.46	±0.13
5/8	15.88	16.33	16.51	0.64	±0.13	0.51	±0.10	0.51	±0.13
3/4	19.05	19.61	19.69	0.76	±0.15	0.64	±0.13	0.51	±0.13
7/8	22.23	22.91	23.55	0.89	±0.18	—	—	—	—
1	25.40	26.16	26.92	0.89	±0.18	—	—	—	—
1.1/4	31.75	32.69	33.66	1.02	±0.18	—	—	—	—
1.1/2	38.10	39.37	40.13	1.14	±0.18	—	—	—	—

Packaging details
are on page 17

Meets or exceeds the following specifications where applicable:

TFE SW – ASTM D 3295, AMS 3653, MIL-I-22129

TFE TW – ASTM D 3295, AMS 3655

TFE LW – ASTM D 3295, AMS 3654

FEP SW – ASTM D 3296

FEP LW – ASTM D 3296.

UL compliant tubing available on request.

In all cases military or commercial specifications, latest revisions apply.

Supplied in natural unless otherwise specified.

Custom Pantone colours and sizes available on request.

polymer



Size	Inside diameter			Wall dimensions					
	minimum <i>in.</i>	nominal <i>in.</i>	maximum <i>in.</i>	Standard wall		Thin wall		Lightweight wall	
				nominal <i>in.</i>	tolerance <i>in.</i>	nominal <i>in.</i>	tolerance <i>in.</i>	nominal <i>in.</i>	tolerance <i>in.</i>
1/8	0.120	0.125	0.130	0.020	±0.004	0.015	±0.003	—	—
1/8	0.125	0.130	0.135	—	—	—	—	0.008	±0.002
3/16	0.188	0.192	0.198	0.020	±0.004	0.015	±0.003	0.010	±0.003
1/4	0.250	0.255	0.260	0.020	±0.004	0.015	±0.003	0.010	±0.003
5/16	0.313	0.321	0.332	0.020	±0.004	0.015	±0.003	0.012	±0.003
3/8	0.375	0.387	0.394	0.025	±0.005	0.015	±0.003	0.015	±0.005
7/16	0.438	0.451	0.458	0.025	±0.005	0.018	±0.004	0.018	±0.005
1/2	0.500	0.515	0.520	0.025	±0.005	0.018	±0.004	0.018	±0.005
5/8	0.625	0.643	0.650	0.025	±0.005	0.020	±0.004	0.020	±0.005
3/4	0.750	0.772	0.775	0.030	±0.006	0.025	±0.005	0.020	±0.005
7/8	0.875	0.902	0.927	0.035	±0.007	—	—	—	—
1	1.000	1.030	1.060	0.035	±0.007	—	—	—	—
1.1/4	1.250	1.287	1.325	0.040	±0.007	—	—	—	—
1.1/2	1.500	1.550	1.580	0.045	±0.007	—	—	—	—

Imperial

PTFE, FEP, PFA, ETFE Extruded Tubing – Industrial Specification *CONTINUED*

Metric	Fractional sizes	I.D. <i>mm</i>	O.D. <i>mm</i>	Nominal Wall <i>mm</i>
	Spec'd by I.D. <i>in.</i>			
	1/32	0.79±0.10	1.60±0.10	0.38
	1/16	1.60±0.13	3.18±0.13	0.76
	3/32	2.39±0.13	3.96±0.13	0.76
	1/8	3.18±0.13	4.78±0.13	0.76
	3/16	4.78±0.13	6.35±0.13	0.76
	1/4	6.35±0.13	7.95±0.13	0.76
	5/16	7.95±0.13	9.53±0.13	0.76
	3/8	9.53±0.13	11.13±0.13	0.76
	7/16	11.13±0.13	12.70±0.15	0.76
	1/2	12.70±0.15	14.30±0.15	0.76
	9/16	14.30±0.15	15.88±0.15	0.76
	5/8	15.88±0.15	17.48±0.15	0.76
	11/16	17.48±0.15	19.05±0.15	0.81
	3/4	19.05±0.15	21.08±0.15	1.02
	7/8	22.23±0.15	24.51±0.15	1.14
	1	25.40±0.25	27.94±0.25	1.27
Packaging details are on page 17	1.1/8	28.58±0.38	30.86±0.38	1.14
	1.1/4	31.75±0.38	34.04±0.38	1.02
	1.1/2	38.10±0.38	40.13±0.38	1.02

Meets or exceeds the following specifications where applicable:

FEP LW – ASTM D 3296, L-P-389.

UL compliant tubing available on request.

In all cases military or commercial specifications, latest revisions apply.

Supplied in natural unless otherwise specified.

Custom Pantone colours and sizes available on request.

polymer



Fractional sizes Spec'd by I.D.	I.D.	O.D.	Nominal Wall
<i>in.</i>	<i>in.</i>	<i>in.</i>	<i>in.</i>
1/32	0.031±0.004	0.063±0.004	0.015
1/16	0.063±0.005	0.125±0.005	0.030
3/32	0.094±0.005	0.156±0.005	0.030
1/8	0.125±0.005	0.188±0.005	0.030
3/16	0.188±0.005	0.250±0.005	0.030
1/4	0.250±0.005	0.313±0.005	0.030
5/16	0.313±0.005	0.375±0.005	0.030
3/8	0.375±0.005	0.438±0.005	0.030
7/16	0.438±0.005	0.500±0.006	0.030
1/2	0.500±0.006	0.563±0.006	0.030
9/16	0.563±0.006	0.625±0.006	0.030
5/8	0.625±0.006	0.688±0.006	0.030
11/16	0.688±0.006	0.750±0.006	0.032
3/4	0.750±0.006	0.830±0.006	0.040
7/8	0.875±0.006	0.965±0.006	0.045
1	1.000±0.010	1.100±0.010	0.050
1.1/8	1.125±0.015	1.215±0.015	0.045
1.1/4	1.250±0.015	1.340±0.015	0.040
1.1/2	1.500±0.015	1.580±0.015	0.040

Imperial

Standard Packaging

AWG

Size	RPL's Length	RPL's Minimum Length	Continuous Length	Straight Length	Packaging
	<i>m</i>	<i>m</i>	<i>m</i>	<i>m</i>	
15 - 32	300	15	150 & 300	n/a	Spooled
10 - 14	150	15	75 & 150	n/a	Spooled
9	75	15	30 & 75	n/a	Spooled
0 - 8	30	15	15 & 30	n/a	Coiled

SW, TW, LW

Size	RPL's Length	RPL's Minimum Length	Continuous Length	Straight Length	Packaging
	<i>m</i>	<i>m</i>	<i>m</i>	<i>m</i>	
1/8" - 3/8"	75	15	30 & 75	n/a	Coiled
7/16" - 3/4"	30	15	15 & 30	n/a	Coiled
>7/8"	n/a	n/a	n/a	2.5	Pieces

Industrial Wall

Size	RPL's Length	RPL's Minimum Length	Continuous Length	Straight Length	Packaging
	<i>m</i>	<i>m</i>	<i>m</i>	<i>m</i>	
1/32"	300	15	150 & 300	n/a	Spooled
1/16" - 3/8"	75	15	30 & 75	n/a	Spooled
7/16" - 5/8"	30	15	15 & 30	n/a	Coiled
>7/8"	n/a	n/a	n/a	2.5	Pieces

Heavy Construction

Size	RPL's Length	RPL's Minimum Length	Continuous Length	Straight Length	Packaging
	<i>m</i>	<i>m</i>	<i>m</i>	<i>m</i>	
1/4" - 3/8"	75	15	30 & 75	n/a	Coiled
7/16" - 5/8"	30	15	15 & 30	n/a	Coiled
11/16" - 15/16"	15	7.5	7.5 & 15	n/a	Coiled
1"+	n/a	n/a	n/a	2.5	Pieces

For all other sizes contact our Sales Department for details

Value Added Services



Etching

- Improves the bondability of tubing without effecting mechanical properties
- Can be done over the length of the tube or for specific lengths on the end
- Extrusions can be etched on the I.D., O.D. or tip

Applications include

- Insulator for fibre optic cable
- Roller covers
- Medical devices
- Anywhere bonding is required

Extruded profiles

In addition to tubing Unasco extrudes profiles in a range of materials and geometries. Applications include medical probes, sealing materials, low friction guides, etc.

Other services

- Colouring
- Custom cutting
- Convuluted and lay-flat tubing
- Custom packaging & labelling
- Drilling
- Filled resins, e.g. radio opaque, glass fibre, bronze, carbon, etc
- Flaring & Flanging
- Heat shrink tubing
- Over extrusion with other polymers
- Slitting, scoring & striping

Burst Pressure

Unasco has supplied fluoropolymer tubing to manufacturers of high pressure devices since our inception in 1962. The innate strength of all fluoropolymers makes their use in these type of applications the ideal choice. The formula below calculates maximum burst pressure by using tensile strength values.

Tensile strengths for all our polymers are shown on page 4.

$$P = \frac{T(x^2 - y^2)}{Y^2(1 + x^2)y^2}$$

where

P = Burst pressure

$$x = \frac{OD}{2}$$

$$y = \frac{ID}{2}$$

T = Tensile strength

This equation is theoretical. It does not factor steam pressure, altitude, etc and is calculated at ambient room temperature. The burst pressure result is intended as a guide only in design, not as a definitive number.