

Fluoropolymers (PTFE, FEP, PFA, PVDF and Modified ETFE)

TYPICAL PROPERTIES OF FLUOROPOLYMERS						
ASTM or UL Test	Property	PTFE	FEP	PFA	PVDF	Modified ETFE
MECHANICAL						
D638	Tensile strength (psi)	3,350	3,000	4,000	5,200-7,400	6,500
D638	Elongation (%)	300	300	300	100-300	275
D638	Tensile modulus (10 ⁵ psi)	0.5	—	—	1.6	1.2
D790	Flexural strength (psi)	No break	No break	No break	No break	No break
D790	Flexural modulus (10 ⁵ psi)	0.5-0.9	0.95	0.95	2.0	2.0
D256	Impact strength, Izod (ft-lb/in of notch)	3.5	No break	No break	3-4	No break
D785	Hardness					
	Rockwell	—	—	—	—	R50
	Shore D	50-65	55	60	80	—
THERMAL						
C177	Thermal conductivity (Btu-in/hr-ft ² -°F)	1.7	1.4	1.8	0.7-0.9	1.65
D696	Coefficient of thermal expansion (10 ⁻⁵ in/in-°F)	5.5-8.4	4.6-5.8	6.7	8.0-8.5	5.2
D648	Deflection temperature (°F)					
	At 264 psi	132	124	118	195	165
	At 66 psi	250	158	164	300	220
UL 94	Flammability rating	V-0	V-0	V-0	V-0	V-0
ELECTRICAL						
D149	Dielectric strength (V/mil) Short time, 1/8-in thk	500-600	500-600	500-600	260	400-500
D150	Dielectric constant At 1 kHz	2.1	2.1	2.1	7.5	2.6
D150	Dissipation factor At 1 kHz	0.00005	0.00005	0.0003	0.019	0.0008
D257	Volume resistivity (ohm-cm) At 73°F, 50% RH	>10 ¹⁸	>10 ¹⁸	>10 ¹⁸	2×10 ¹⁴	10 ¹⁶
D495	Arc resistance (s)	>300	>180	>180	50-70	75
OPTICAL						
D542	Refractive index	1.350	1.344	1.350	1.42	1.403
D1003	Transmittance (%), 1-mil film	—	>95	>95	>90	—
FRICTIONAL						
—	Coefficient of friction Against steel (100 psi, 10 fpm)	0.050	0.330	0.214	0.14	0.400

*Crystalline compound. †Below and above 135°F.

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TYPICAL PROPERTIES OF FLUOROPOLYMERS						
ISO or UL Test	Property	PTFE	FEP	PFA	PVDF	Modified ETFE
MECHANICAL						
ISO527	Tensile strength (MPa)	22	21	27	36-51	45
ASTM D638	Elongation (%)	300	300	300	100-300	275
ISO527	Tensile modulus (10 ³ MPa)	0.344	—	—	1.10	0.83
ISO178	Flexural strength (MPa)	No break	No break	No break	No break	No break
ISO178	Flexural modulus (MPa)	344-620	655	655	1,378	1,378
ISO180	Notched izod impact strength (J/m)	187	No break	No break	160-214	No break
ISO2039	Hardness					
	Rockwell	—	—	—	—	R50
	Shore D	50-65	55	60	80	—
THERMAL						
ISO8302	Thermal conductivity (W/(mK))	0.25	0.25	—	—	0.23
ISO11359	Coefficient of thermal expansion (10 ⁻⁴ m/m°C)	0.99-1.51	0.82-1.04	1.20	1.40-1.50	1.20
ISO75	Deflection temperature (°C)					
	At 1.80 MPa	56	51	48	91	74
	At 0.45 MPa	121	70	73	149	104
UL 94	Flammability rating	V-0	V-0	V-0	V-0	V-0
ELECTRICAL						
IEC243	Dielectric strength (kV/mm)					
	Short time, 3mm thk	19.7-23.6	19.7-23.6	19.7-23.6	10.24	15.7-19.7
IEC250	Dielectric constant					
	At 1 kHz	2.1	2.1	2.1	7.5	2.6
IEC250	Dissipation factor					
	At 1 kHz	0.00005	0.00005	0.0003	0.019	0.0008
IEC93	Volume resistivity (ohm-cm)					
	At 23°C, 50% RH	>10 ¹⁸	>10 ¹⁸	>10 ¹⁸	2×10 ¹⁴	10 ¹⁶
ASTM D495	Arc resistance (s)	>300	>180	>180	50-70	75
OPTICAL						
ISO489	Refractive index	1.350	1.344	1.350	1.42	1.403
ASTM D1003	Transmittance (%), 0,0254mm film	—	>95	>95	>90	—
*Crystalline compound. †Below and above 57°C.						