

ETFE Fluoropolymer Extruded Films

ETHYLENE TETRAFLUOROETHYLENE FILM FOR USE IN HIGH-PERFORMANCE APPLICATIONS

TCI's ETFE films are produced from ethylene and tetrafluoroethylene co-polymer resin by melt extrusion casting process. ETFE films can be heat-sealed, thermoformed, and laminated to various substrates. These materials are ideally suited for architectural, solar, and mold release applications.

TCI's ETFE Film Characteristics

- Thickness range from 0.0005" to 0.010" (12 to 250 mμ)
- Standard width: 60" (1,524 mm)
- Width up to 62" (1,575 mm) available
- Any slit widths available upon request
- Bondable (plasma treated or chemically etched) surfaces available
- Broad continuous use temperature range from -328°F to 330°F (-200°C to 165 °C)
- Short term exposure of up to 400°F (204°C)
- Melt temperature minimum of 500°F (260°C)
- Excellent non-stick / release properties
- High elongation and tear resistance
- Excellent light transmission (>90%) and clarity, high transmittance of ultraviolet and all but far infrared wavelengths
- Superior weatherability in outdoor exposure
- High dielectric strength, 5,500 V/mil for 1-mil film (215 kV/mm for 25 mµ film)
- Free of plasticizers, processing aids, or additives
- Low permeability to liquids, gases, moisture, and organic vapors



TCI's ETFE Films Are Available In Two Grades:

ETFE PG (Premium Grade)

- Manufactured from 100% virgin premium grade ETFE resin
- ETFE PG is the grade of choice for applications requiring visual perfection
- ETFE's unique combination of high light transmission, clarity, and durability make it an invaluable material for applications such as architectural roofing, front glazing of solar panels, decorative, anti-graffiti, and greenhouses

ETFE MR (Mold Release Grade)

- ETFE MR is the material of choice for a release film in high temperature composite molding due to its superior non-stick properties and high upper use temperature in static applications
- Offers 20% higher area yield than FEP and PTFE: 110 ft²/lb. for 1 mil film (22.6 m²/kg for 25 mµ film)
- High elongation and excellent conformability to complex, contoured molds
- Standard colors include red and light blue, custom colors available upon request
- Available in a variety of perforated patterns

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ETHYLENE TETRAFLUOROETHYLENE FILM FOR USE IN HIGH-PERFORMANCE APPLICATIONS

AFIM D792 1.74 Area Yield Ritibrimit (m2kg/25mµ) 110 (22.6) Flammability UL-94 V-0 Water Absoption % < 0.03 Mechanical Properties Flenighability Psi (MPa) Flenighability ASTM D882 7,000 (48) Flenighability Psi (MPa) ASTM D882 300 Flensile Strength Psi (MPa) ASTM D882 140,000 (965) Initial Tear Strength (2 mil film) g ASTM D882 140,000 (965) Initial Tear Strength (2 mil film) g ASTM D1004 500 Flending Endurance (MIT) oycles, ave. ASTM D1922 75 Folding Endurance (MIT) oycles, ave. ASTM D1922 75 Folding Endurance (MIT) oycles, ave. ASTM D176 >50,000 Thermal Properties Pf (*C) ASTM D3418 500 (260) Coeff. of Lin. Thermal Expansion in/(in *F) ASTM D3418 500 (260) Coeff. of Lin. Thermal Expansion in/(in *F) ASTM D686 4x10² Electrical Properties Dielectric Strength (1mil film) volts / mil ASTM D199 5,500 n/a Dielectric Strength (1mil film) volts / mil ASTM D150 <0.0008 n/a Dielectric Contant fikHz ASTM D150 <0.0008 n/a Dielectric Gordant fikHz ASTM D150				ETFE PG	ETFE MR
Area Yield framability UL-94 V-0 Water Absoption % Solon Strength (Prilipe (MPa))	General Properties	Units	Test Method		
Flammability Water Absoption % V-0	Specific Gravity		ASTM D792	1.74	
Water Absoption %	Area Yield	ft²/lb/mil (m2/kg/25mµ)		110 (22.6)	
Mechanical Properties psi (MPa) ASTM D882 7,000 (48)	Flammability		UL-94	V-0	
Tensile Strength	Water Absoption	%		<0.03	
Section Sec	Mechanical Properties				
Tensile Modulus	Tensile Strength	psi (MPa)	ASTM D882	7,000 (48)	
Initial Tear Strength (2 mil film) g ASTM D1004 500 Propagation Tear Strength (2 mil film) g ASTM D1922 75 Folding Endurance (MIT) cycles, ave. ASTM D2176 >50,000 Thermal Properties Continuous Use Temp °F (°C) UL-746 B 330 (165) Melt Point °F (°C) ASTM D3418 500 (260) Coeff. of Lin. Thermal Expansion in/(in °F) ASTM D696 4x10° Electrical Properties	Elongation at Break	%	ASTM D882		
Propagation Tear Strength (2 mil film)	Tensile Modulus	psi (MPa)	ASTM D882	140,000 (965)	
Folding Endurance (MIT)	Initial Tear Strength (2 mil film)	g	ASTM D1004		
Thermal Properties Continuous Use Temp °F (°C) UL-746 B 330 (165)	Propagation Tear Strength (2 mil film)	g	ASTM D1922	75	
Continuous Use Temp °F (°C) UL-746 B 330 (165) Melt Point °F (°C) ASTM D3418 500 (260) Coeff. of Lin. Thermal Expansion in/(in °F) ASTM D696 4x10 ⁻⁶ Electrical Properties	Folding Endurance (MIT)	cycles, ave.	ASTM D2176	>50,000	
Melt Point	Thermal Properties				
Coeff. of Lin. Thermal Expansion	Continuous Use Temp	°F (°C)	UL-746 B	330 (165)	
Dielectrical Properties Dielectric Strength (1mil film) Volts / mil ASTM D149 5,500 n/a	Melt Point	°F (°C)	ASTM D3418		
Dielectric Strength (1mil film) Volts / mil ASTM D149 5,500 n/a	Coeff. of Lin. Thermal Expansion	in/(in °F)	ASTM D696	* *	
Dielectric Contant 1kHz	Electrical Properties				
Dissipation Factor, 1kHz	Dielectric Strength (1mil film)	volts / mil	ASTM D149	5,500	n/a
Optical Properties ASTM D542 1.4 n/a Refractive Index ASTM D542 1.4 n/a Solar Transmission (2-4 mil) (50 μm – 100 μm) % ASTM E424 94 n/a Product Offering Width inches (mm) Up to 62" (1,575) Thickness mils (μm) 0.5 - 10 (12.5 - 250) 0.5 - 2 (12.5 - 50) Standard Colors Clear Blue, Red Surface Treatments Available • • Chemical Etching • • Plasma Treatment • • Applications, Markets • • Composite Molding Process: Release Films • • Chemical Process / Equipment • • Heat Sealing / Welding / Melt Adhesive • • Electrical / Electronics • • Medical • •	Dielectric Contant 1kHz		ASTM D150	2.6	n/a
Refractive Index	Dissipation Factor, 1kHz		ASTM D150	<0.0008	n/a
Solar Transmission (2-4 mil) (50 μm – 100 μm)	Optical Properties				
Product Offering Width inches (mm) Up to 62" (1,575) Thickness mils (μm) 0.5 - 10 (12.5 - 250) 0.5 - 2 (12.5 - 50) Standard Colors Clear Blue, Red Surface Treatments Available • • Chemical Etching • • Plasma Treatment • • Applications, Markets • • Composite Molding Process: Release Films • • Chemical Process / Equipment • • Heat Sealing / Welding / Melt Adhesive • • Electrical / Electronics • • Medical • • Optical /Photovoltaics • •	Refractive Index		ASTM D542	1.4	n/a
Product Offering Width inches (mm) Up to 62" (1,575) Thickness mils (μm) 0.5 - 10 (12.5 - 250) 0.5 - 2 (12.5 - 50) Standard Colors Clear Blue, Red Surface Treatments Available • • Chemical Etching • • Plasma Treatment • • Applications, Markets • • Composite Molding Process: Release Films • • Chemical Process / Equipment • • Heat Sealing / Welding / Melt Adhesive • • Electrical / Electronics • • Medical • • Optical /Photovoltaics • •	Solar Transmission (2-4 mil) (50 µm – 100 µm)	%	ASTM E424	94	n/a
Thickness	Product Offering				
Standard Colors Surface Treatments Available Chemical Etching Plasma Treatment Applications, Markets Composite Molding Process: Release Films Chemical Process / Equipment Heat Sealing / Welding / Melt Adhesive Electrical / Electronics Medical Optical / Photovoltaics Clear Blue, Red Blue, Red Blue, Red Surface Treatment	Width	inches (mm)		Up to 62" (1,575)	
Surface Treatments Available Chemical Etching Plasma Treatment Applications, Markets Composite Molding Process: Release Films Chemical Process / Equipment Heat Sealing / Welding / Melt Adhesive Electrical / Electronics Medical Optical /Photovoltaics	Thickness	mils (µm)		0.5 - 10 (12.5 - 250)	0.5 - 2 (12.5 - 50)
Chemical Etching Plasma Treatment Applications, Markets Composite Molding Process: Release Films Chemical Process / Equipment Heat Sealing / Welding / Melt Adhesive Electrical / Electronics Medical Optical /Photovoltaics	Standard Colors			Clear	Blue, Red
Plasma Treatment Applications, Markets Composite Molding Process: Release Films Chemical Process / Equipment Heat Sealing / Welding / Melt Adhesive Electrical / Electronics Medical Optical /Photovoltaics	Surface Treatments Available				
Applications, Markets Composite Molding Process: Release Films Chemical Process / Equipment Heat Sealing / Welding / Melt Adhesive Electrical / Electronics Medical Optical /Photovoltaics	Chemical Etching			•	
Composite Molding Process: Release Films Chemical Process / Equipment Heat Sealing / Welding / Melt Adhesive Electrical / Electronics Medical Optical /Photovoltaics	Plasma Treatment			•	
Composite Molding Process: Release Films Chemical Process / Equipment Heat Sealing / Welding / Melt Adhesive Electrical / Electronics Medical Optical /Photovoltaics	Applications, Markets				
Chemical Process / Equipment Heat Sealing / Welding / Melt Adhesive Electrical / Electronics Medical Optical /Photovoltaics	Composite Molding Process: Release Films				•
Heat Sealing / Welding / Melt Adhesive Electrical / Electronics Medical Optical /Photovoltaics	Chemical Process / Equipment			•	
Electrical / Electronics • Medical • Optical /Photovoltaics •	Heat Sealing / Welding / Melt Adhesive			•	
Medical Optical /Photovoltaics Optical /Photovoltaics	Electrical / Electronics			•	
	Medical			•	
	Optical /Photovoltaics			•	
	Protective/Decorative			•	

The above table contains typical representative values and is not to be used for product specification. Contact TCI for a formal specification.

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