

# CHEMFILM®

HIGH PERFORMANCE FILMS



# CHEMFILM<sup>®</sup>

## High Performance Films



### Extruded Fluoropolymer Films

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- Melt-processable fluoropolymers
- Broadest fluoropolymer film product line on the market
- Up to 60" wide webs, thickness range from 0.0005" to 0.010"
- Cementable/bondable surface versions available
- Precision slitting and converting in white-glove environment

### Cast PTFE Films

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- Multi-layer construction
- Individual layers configured with different polymers and polymer blends
- Inherently void- and pinhole-free; superior dielectric performance
- Superior drape and conformability
- Up to 50" wide thickness from .00025" to .005"
- Cementable, heat-weldable and pressure sensitive adhesion versions available

### Skived PTFE and UHMW PE Films and Sheet

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- Up to 60" wide webs, thickness range from 0.0005" to 0.125"
- Superior flatness
- Cementable/bondable surface versions available
- Tightest tolerances in the industry

### Polyimide Films

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- Technically advanced for superior performance
- Dimensionally stable and inherently isotropic
- Temperature resistant from -265°C to over 400°C (-445°F to 725°F)
- Up to 61.8" wide, thickness range from 0.0005" to 0.005"

### Zitex<sup>®</sup> Porous PTFE Membranes

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- For venting, diffusion, filtering and sealing
- 100% PTFE
- High vent rates
- Self-supporting membrane
- Hydrophobic

**Engineered For Demanding Applications – CHEMFILM offers the broadest line of high-performance polymeric films. Saint-Gobain has more than 40 years of experience in selecting and processing premium grade polymers into specialty films to deliver the perfect combination of temperature, chemical and dielectric performance for your application. We utilize a full range of polymers, including FEP, PFA, PTFE, ETFE, ECTFE, PI and UHMW PE. For extremely demanding film applications, CHEMFILM is your partner of choice for the long term.**



## Industrial

### Chemical

Our products are designed to fulfill many demanding chemical-related applications, such as tank linings, see-through windows, rupture discs, pump diaphragms and thermoformed packaging.

- Extruded FEP, PFA, ETFE and ECTFE
- Skived PTFE film and sheet T-100

### Protective/Decorative

This complete line of fluoropolymer products offers the highest levels of environmental and chemical protection. Utilizing various surface modification technologies, products are available in bondable (cementable) form that allows end users to laminate/bond films with a multitude of substrates to combine the high performance of fluoropolymers with virtually any material of their choice.

- Extruded FEP, PFA, ETFE, ECTFE and Fluorolam®

## Electronics

A combination of excellent dielectric properties with outstanding temperature and chemical stability make high-performance films perfect candidates for processing aids in the manufacture of integrated circuits or as dielectric components in energy storage devices such as capacitors and batteries.

- Extruded ETFE and PFA
- Cast PTFE films DF100, DF1100, 1200, DF1400, DF1700 and DF1900 series

## Aerospace

Covering the broadest range of service temperatures from 100°C (212°F) to 260°C (500°F), the

family of release films fulfill all the processing requirements of structural composite components for the aerospace industry. Polyimide film is used as a high-temperature bagging film for autoclave processing of composites.

- Extruded FEP and ETFE release films
- Cast PTFE MR release film
- VB3 bagging film
- Polyimide

## Life Sciences

Fluoropolymer films are perfectly suited for containment applications of biological samples and drug chemistries. Their inert nature and broad operational temperature range means they will not contaminate the stored media and they will continue to perform when exposed to extremely low temperatures for lyophilization storage and extreme elevated temperatures for sterilization. Applications include medical sample bags and cap liner/stopper laminates.

- Extruded FEP, ETFE
- Cast PTFE DF1100 Series

## Energy

### Photovoltaic

CHEMFILM ETFE is an industry established product for use as the front protective sheet for lightweight, rigid or flexible photovoltaic panels. ETFE frontsheets provide the necessary dielectric and environmental protection for the lifetime of your module.

- Extruded ETFE

### Wind Turbine

CHEMFILM fluoropolymer films, along with CHR® Tape products provide a clean release of the composite wind blade from the mold.

## Emerging Technologies

Saint-Gobain is the global pioneer in the development of multi-layer film technologies. Beginning with Fluorolam, the world's first multi-layer fluoropolymer product, our technologists now have achieved this accomplishment in melt-processable fluoropolymers. Our proprietary technology allows us to combine new groups of materials to achieve greater levels of performance. Our goal is simple — deliver the performance you need, where you need it.

### ETFE-LM

ETFE-LM film is a high elongation, low modulus specialty grade of ETFE. It can be molded into and around complex geometries that would result in film breakage with other fluoropolymers. Using ETFE-LM will increase process yield and throughput.

### Surface Texturing Modification

Saint-Gobain is proud to introduce our new surface texture technology available on ETFE films up to 60" (1,524 mm) wide. Our technology directly imparts a permanent surface texture to the film yet still maintains excellent gauge control across the full width of the material. ETFE produced with Saint-Gobain's surface texture technology retains all of the mechanical, chemical and temperature performance of standard ETFE products. By adding the surface texture directly to this already high-performance film, we now offer a new product that is perfectly suited for several applications.

**Ask your SGPPL sales representative how our material expertise can help you unlock profits from your operation.**

# CHEMFILM® High Performance Extruded Films

	Product Type	PFA	Thick PFA	FEP	
	Film Grades	PG, WF	PGT	FG, RF, WF	
GENERAL PROPERTIES	Units	Test Method			
Specific Gravity	ft²/lb/mil	ASTM D792	2.15	2.15	2.15
Area Yield			90	90	90
Flammability		UL-94	V-0	V-0	V-0
Water Absorption		%	<0.01	<0.01	<0.01
MECHANICAL PROPERTIES					
Tensile Strength	psi	ASTM D882	2,250	2,250	3,500
Elongation @ Break	%	ASTM D882	300	300	300
Tensile Modulus	psi	ASTM D882	70,000	70,000	70,000
Initial Tear Strength	g/mil	ASTM D1004	250	250	225–275
Propagation Tear Strength	g/mil	ASTM D1922	125–135	125–135	145–150
THERMAL PROPERTIES					
Continuous Use Temperature (20,000 Hrs)	°C (°F)	UI-746 B	260 (500)	260 (500)	205 (400)
Melt Point (Typical)	°C (°F)	ASTM D3418	305 (580)	305 (580)	260 (500)
Coefficient of Linear Thermal Expansion	in/(in °F)	ASTM D696	5.5x10 <sup>-5</sup>	5.5x10 <sup>-5</sup>	5.5x10 <sup>-5</sup>
ELECTRICAL PROPERTIES					
Dielectric Strength	volts / mil	ASTM D149	4,700	4,700	6,000
Dielectric Constant, 1 Khz		ASTM D150	2.1	2.1	2.1
Dissipation Factor, 1 Khz		ASTM D150	0.0005	0.0005	0.0003
Surface Resistivity	ohm/sq	ASTM D257	1x10 <sup>15</sup>	1x10 <sup>15</sup>	1x10 <sup>15</sup>
OPTICAL PROPERTIES					
Refractive Index		ASTM D542	1.35	1.35	1.35
Solar Transmission	%	ASTM E424	96	96	96
CHEMICAL RESISTANCE					
Relative (1=Highest)			1	1	1
PRODUCT OFFERING					
Width	inches		0.5–60	0.5-48	0.5–60
Thickness	mils		0.5–10	20, 60, 95	0.5–10
Standard Colors			Clear	Clear	Clear, White, Red, Violet
SURFACE TREATMENTS AVAILABLE					
C-Treatment (Cementable, 1 or 2 Sides)			•		•
Corona Treatment (1 or 2 Sides)					
Chemical Etching (1 or 2 Sides)			•		•
Surface Texture					
INDUSTRIES					
Aerospace			•		•
Industrial			•	•	•
Electronics			•		•
Life Sciences			•		•
Energy					
Auto/Transportation					•



FEP	Thick FEP-FS	ETFE			ECTFE	Fluorolam	Polyimide
FS	FST	E2, RF	E4	LM		T	TH-025
2.13-2.17	2.13-2.17	1.72-1.76 110 V-0 <0.03	1.75-1.79	1.78 110 V-0	1.68 115 V-0 <0.01	1.55 124 — —	1.46 136 V-0 <2.8
2500 250	2500 250	7,000 >400 140,000 — 295	>400	6,000 >350 104,000	8,000 250 200,000 450 >1200	4,000 350 — — —	34,000 85 425,000 — —
		165 (330) 260 (500) 4x10 <sup>-5</sup>		225 (437)	170 (340) 240 (465) 9x10 <sup>-5</sup>	130 (265) — —	235 (455) 716-770 Tg 2.5x10 <sup>-5</sup>
		5,500 2.6 <0.0008 1x10 <sup>14</sup>			5,500 2.6 <0.005 —	4,600 — — —	7,000 3.3 @ 1MHz 0.004 @ 1MHz >1x10 <sup>16</sup>
		1.4 90			1.4 —	— 84	1.7 —
		3			2	3	3
0.5-60 0.1-10	0.5-48 20, 30, 60, 95 Clear	0.5-60 0.5-10 Clear, Red, Blue	0.5-60 0.5-10	0.5-60 0.5-10	0.5-60 0.5-10 Clear	1-60 1 Clear, White	0.125-61.8 0.5, 1, 2, 3, 5 Amber
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Values shown are typical. Certified test reports for writing specifications are available.

# CHEMFILM® Fluoropolymer Cast Films and Skived Films

CHEMFILM Fluoropolymer Cast Films

	Product Type	MR	VB	DF100	C&CD	
	Description		Bondable			
GENERAL PROPERTIES		Units	Test Method			
Specific Gravity	ft²/lb/mil	ASTM D792	2.15	2.15	2.15	2.15
Area Yield			90	90	90	90
Flammability		UL-94	V-0	V-0	V-0	V-0
Water Absorption	%		<0.01	<0.01	<0.01	<0.01
MECHANICAL PROPERTIES						
Tensile Strength	psi	ASTM D882	4,500	4,300	4,300	4,300
Elongation @ Break	%	ASTM D882	400	550	400	400
Tensile Modulus	psi	ASTM D882	55,000	55,000	60,000	60,000
Initial Tear Strength	g/mil	ASTM D1004	500	—	—	—
Propagation Tear Strength	g/mil	ASTM D1922	—	—	—	—
THERMAL PROPERTIES						
Continuous Use Temperature (20,000 Hrs)	°F (°C)	UI-746 B	500 (260)	500 (260)	500 (260)	500 (260)
Melt Point (Typical)	°F (°C)	ASTM D3418	620 (327)	620 (327)	620 (327)	620 (327)
Coefficient of Linear Thermal Expansion	in/(in°F)	ASTM D696	5.5x10 <sup>-5</sup>	5.5x10 <sup>-5</sup>	5.5x10 <sup>-5</sup>	5.5x10 <sup>-5</sup>
ELECTRICAL PROPERTIES						
Dielectric Strength	volts / mil	ASTM D149	n/a	n/a	4,200	4,200
Dielectric Constant, 1 Khz		ASTM D150	n/a	n/a	2	2
Dissipation Factor, 1 Khz		ASTM D150	n/a	n/a	n/a	n/a
Surface Resistivity	ohm/sq	ASTM D257	n/a	n/a	9.0x10 <sup>17</sup>	9.0x10 <sup>17</sup>
OPTICAL PROPERTIES						
Refractive Index		ASTM D542	n/a	n/a	n/a	n/a
Solar Transmission	%	ASTM E424	n/a	n/a	n/a	n/a
CHEMICAL RESISTANCE						
Relative (1=Highest)			1	1	1	1
Product Offering						
Width	inches		48	50	1/8–38.5	up to 18
Thickness	mils		1, 2	3	1–5	0.17–0.75
Standard Colors			Red, Blue, Purple, White, Natural	Natural, Green	Natural	Natural
SURFACE TREATMENTS AVAILABLE						
C-Treatment (Cementable, 1 or 2 Sides)					●	
Corona Treatment (1 or 2 Sides)						
Chemical Etching (1 or 2 Sides)					●	●
Chemlink Bondable				●		
Heat Bondable						
INDUSTRIES						
Aerospace			●	●		
Industrial			●	●	●	●
Electronics				●	●	●
Life Sciences					●	●
Energy				●		●
Auto/Transportation					●	●

CHEMFILM Fluoropolymer Cast Films					Skived Films	
DF1100	DF1400	DF1471	DF1700	DF1900	PTFE T-100	UHMW PE
Bondable	Conductive	Conductive	Bondable	Bondable	Virgin PTFE	
2.15	2.15	2.15	2.15	2.15	2.15	0.93-1.00
90	90	90	90	90	90	200
V-0	V-0	V-0	V-0	V-0	V-0	n/a
<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05
4,300	4,000	4,000	4,300	4,300	3,000-4,000	5,500
400	400	400	400	400	200-300	200-300
60,000	60,000	60,000	60,000	60,000	80,000	—
—	—	—	—	—	—	—
—	—	—	—	—	—	—
500 (260)	500 (260)	500 (260)	500 (260)	500 (260)	500 (260)	200 (93)
620 (327)	620 (327)	620 (327)	n/a	n/a	620 (327)	275 (135)
—	—	—	—	—	5.0x10 <sup>-5</sup>	11x10 <sup>-5</sup>
4,200	4,200		4,200	4,200	700-3,000	n/a
2	12	12	2	2	2.1	n/a
n/a	n/a	n/a	n/a	n/a	<0.0002	n/a
2.0x10 <sup>17</sup>	Conductive	Conductive	1.0x10 <sup>18</sup>	1.0x10 <sup>18</sup>	n/a	n/a
n/a	n/a	n/a	n/a	n/a	n/a	n/a
n/a	n/a	n/a	n/a	n/a	n/a	n/a
1	1	1	1	1	1	5
1-38.5	1/8-18	1/8-18	1/8-40	1/8-40	1/4-60	1/2-30
1-5	2.5	1-4	0.5-5	1-5	.5-125	2-25
On Request	Black	Black	On Request	On Request	Natural	On
			•	•		
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			•	•		
•	•	•	•	•	•	•
•	•	•	•	•	•	
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Values shown are typical. Certified test reports for writing specifications are available.



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