

Rowlar™

Fluoropolymer Film for Photovoltaic Glazing

IN FILM
FIRST

Features and Benefits

- **Weatherability** - Kynar PVDF is known for outstanding weathering performance
- **Energy Transmission** - High efficiency, runs cool, lower refractive index than glass
- **Low Surface Energy** - Slow to soil, easy to clean, mold and mildew resistant
- **Thin & Flexible** - Conforms to a variety of surfaces, applications & designs
- **Light Weight** - Easy to handle, allows rapid installation
- **Shatterproof** - Safer than glass, good for military applications
- **Barrier Protection** - Good oxygen barrier
- **Flame Retardant** - Self-extinguishing, UL 94 VTM 0
- **Matte Surface Finish** - Low reflection and glare

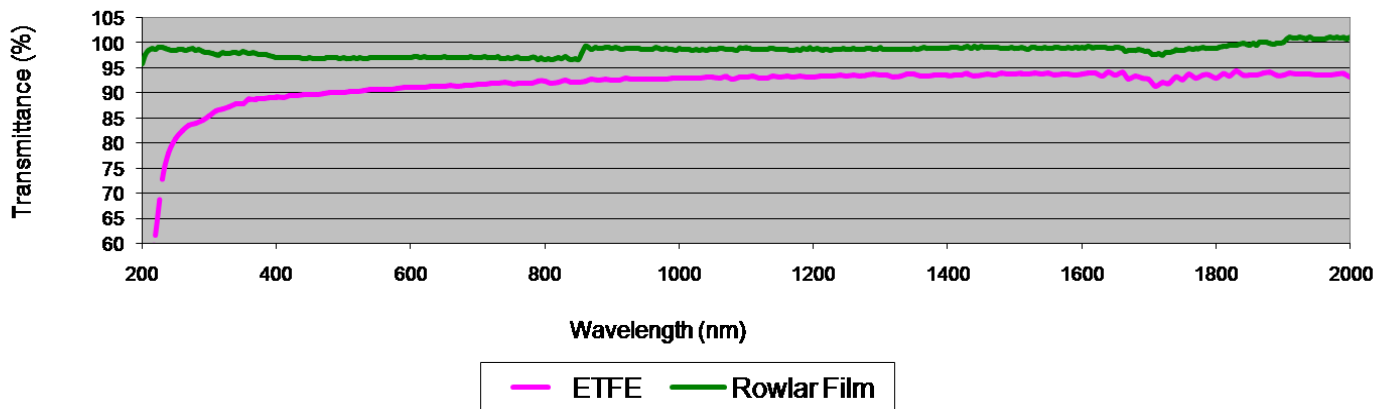
Compared to ETFE, Rowlar Film is more:

Transparent

Abrasion-Resistant (50% greater)

Cost-Effective

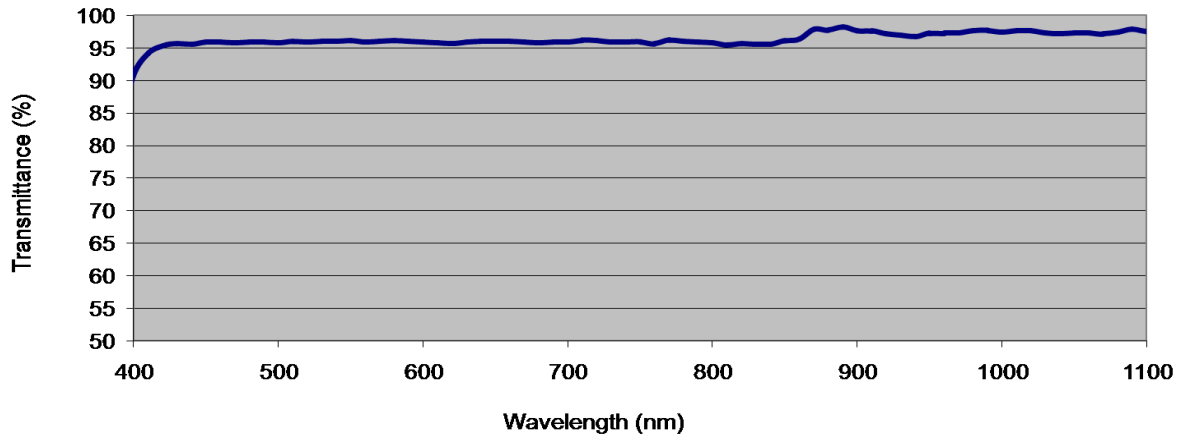
Light Transmission Spectra for 0.002 inch thick film



Rowlar film is made from
Kynar PVDF resin



Transmission spectra for 0.002 inch thick Matte/Gloss surface Rowlar film laminated with the matte side up to 0.018 inch thick EVA. Rowlar film's higher transmission is maintained. Rowlar's matte finish on the outside results in increased transmission. Average transmission from 400- 1100 nm is 96%.



Average Properties of Rowlar™ Fluoropolymer Film For Photovoltaic Glazing

Physical	Test Method	Units	Typical Value
Specific Gravity	ASTM G-792		1.78
Water Absorption	ASTM D-570	%	.03 - .05
Falling Sand Abrasion Resistance	ASTM D-968	liters/mil	120
Area Factor		ft ² /lb/mil	108
Optical	Test Method	Units	Typical Value
Light Transmission	ASTM D-1003	%	>93
Haze	ASTM D-1003	%	<9
Index of Refraction	ASTM D-542		1.42
Thermal	Test Method	Units	Typical Value
Melt Temperature	ASTM D-3418	°F (°C)	320-342 (160-172)
Continuous Use Temp Range		°F (°C)	-40 to 248 (-40 to 120)
Short Cycle Use Temp		°F (°C)	Up to 302 (150)
Linear Exp. Coefficient	ASTM D-696	in/in/°F (mm/mm/°C)	7x10 ⁻⁵ (13x10 ⁻⁵)
Electrical	Test Method	Units	Typical Value
Dielectric Strength	ASTM D-149	kV/mm	1.3 - 1.5
Dielectric Constant	ASTM R150		3.2-10.2
100 MHz - 100 Hz @ 23°C			
Volume Resistivity	ASTM D-257/DC	ohm/cm	1x10 ¹⁵ - 1x10 ¹⁶
Flame & Smoke Properties	Test Method	Units	Typical Value
Limiting Oxygen Index	ASTM D-2868	% O ₂	42
Burning Rate	UL 94		VTM 0

Typical Mechanical Properties

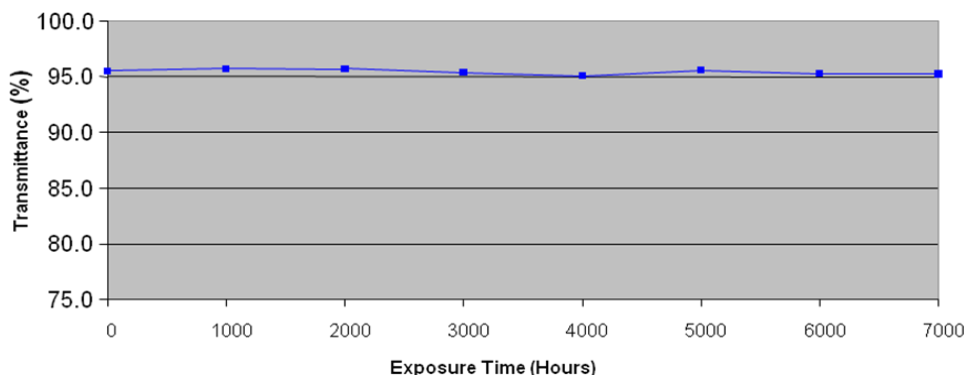
Nominal Thickness	Tensile Yield (psi) ASTM D-882		Stress @ Break (psi) ASTM D-882		Elongation (%) ASTM D-882		Tensile Modulus (kpsi) ASTM D-882	
	Machine Direction	Transverse Direction	Machine Direction	Transverse Direction	Machine Direction	Transverse Direction	Machine Direction	Transverse Direction
0.002 inches	4250	4200	9700	6700	620	650	100	120
0.004 inches	4300	4100	9400	7200	610	590	125	130

Nominal Thickness	Graves Tear (gf/mm) ASTM D-1004	
	Machine Direction	Transverse Direction
0.002 inches	590	550
0.004 inches	610	590

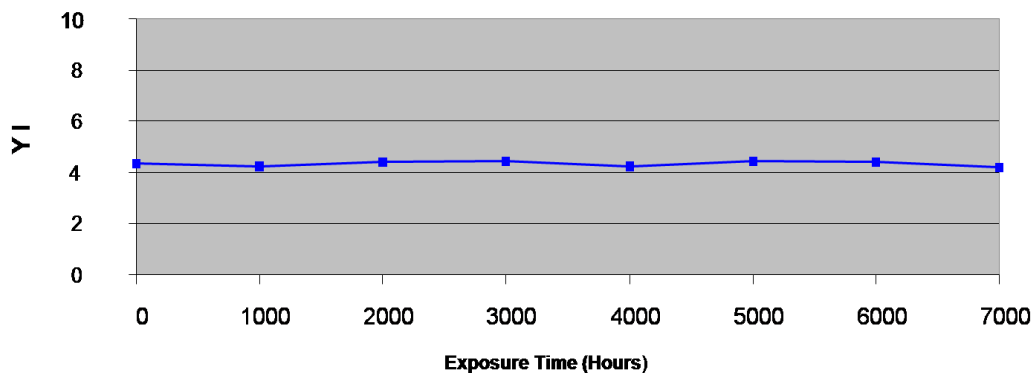
WEATHERING OF ROWLAR™ FILM

Rowlar film is produced from Kynar® resin, a material that has been well known for its many years of superior performance in outdoor conditions. Rowlar film has excellent UV exposure properties. It has logged more than 7000 hours of QUV B313 exposure with no change in Transmittance, Yellowness Index, or Tensile Elongation at Break.

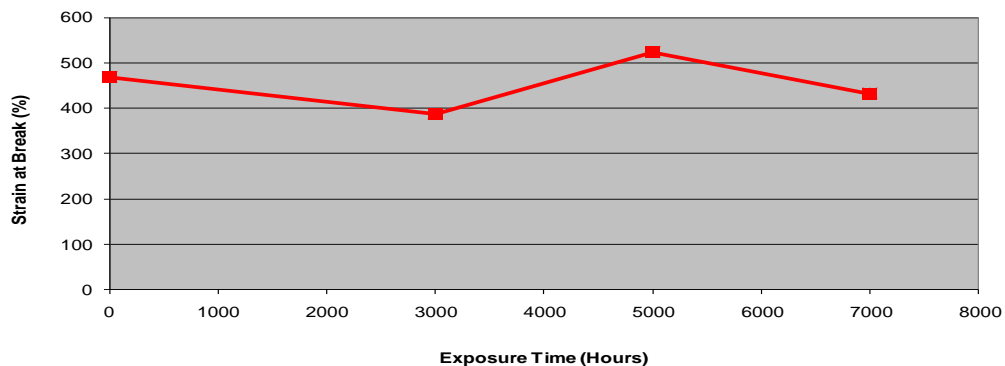
Transmittance Stability after 7000 Hours of QUV B313 Exposure



Color Stability after 7000 Hours of QUV B313 Exposure



Tensile Elongation after 7000 Hours of QUV B313 Exposure



Data provided by Arkema Inc. and used exclusively with their consent



Rowland Technologies, Inc. manufactures the world's best plastic film and sheet for the most demanding applications. Our customers value our innovative solutions, dedication to continuous improvement and our overall commitment to excellence. Our products and services include:

- RowTec®
 - Polycarbonate Film
- SolaTuf®
 - Impact Modified Acrylic Film
- Rowlux®
 - Multi-Lensed Illusion Film
- Rowlar™
 - Fluoropolymer Film
- Polyetherimide (Ultem®) Film and Sheet
- Polysulfone Film and Sheet
- Polyphenylsulfone (Radel®) Film and Sheet
- Engravable Sign Film and Sheet Components
- Electro- Conductive and Static Dissipative Film
- Toll Extrusion
- Research and Development Extrusion

To find out more, call 203-269-9500 or visit our website at www.rowtec.com

RowTec®, SolaTuf® and Rowlux® are registered trademarks of Rowland Technologies, Inc.
Rowlar™ is a trademark of Rowland Technologies, Inc.
Ultem® is a registered trademark of Sabic Innovative Plastics
Radel® is a registered trademark of Solvay Advanced Polymers
Kynar® is a registered trademark of Arkema, Inc.

PLEASE NOTE: Properties reported here are typical of average lots. Rowland Technologies, Inc. makes no representation that the material in any particular shipment will conform exactly to the values given herein nor is Rowland Technologies, Inc. responsible for the performance of this material for a given application. The user of the material should perform their own testing to determine the suitability of the material for the intended use. Applications depicted herein are not specifications. They are provided for information only.