

3M™ Sun Control Window Film





PR 40X

Technical Data

Product Benefits

- High Visible Light Transmission, High Clarity, Extremely High Total Solar Energy Rejection
- No metals in the film, means no signal interference, no edge sealing needed, and no chance of corrosion
- Reduces air conditioning costs.
- Stay cooler by reducing excessive heat in warmer months.
- Reduces glare and eye discomfort.
- Excellent for store front application to reduce exterior reflection
- Excellent film for skylight applications
- Protects glass from graffiti
- Hydrophobic hardcoat helps to keep the exterior surface of the glass look cleaner
- Reduces the risk of thermal fracture
- Extend the life and vibrancy in the fabric of furniture and carpets.
- Reduces injury risk from flying glass.

Product Performance & Technical Data

<u>PR40X</u>								
	Single Pane		Tinted		Double Pane		Double tinted	
Film	1/4" Clear	PR40X	1/4" tint	PR40X	Dual 1/4" Clear	PR40X	Dual 1/4" tint	PR40X
Solar Heat Gain Coefficient	0.82	0.39	0.63	0.33	0.70	0.29	0.51	0.23
Visible Light Transmitted	89%	42%	53%	25%	79%	37%	47%	22%
Visible Light Reflected Interior	9%	5%	6%	5%	15%	13%	13%	12%
Visible Light Reflected Exterior	8%	6%	6%	5%	15%	7%	8%	6%
U Value	1.03	1.02	1.03	1.02	0.47	0.47	0.47	0.47
UV Block	38%	99.9%	NA	99.9%	NA	99.9%	NA	99.9%
Total Solar Energy Rejected	19%	61%	37%	67%	30%	71%	49%	77%
Glare Reduction	NA	53%	NA	53%	NA	53%	NA	53%
Heat Loss Reduction	NA	0%	NA	0%	NA	1%	NA	0%
Solar Heat Reduction	NA	53%	NA	47%	NA	59%	NA	55%

Important:

The information provided in this report is believed to be reliable; however, due to the wide variety of intervening factors, 3M does not warrant that the results will necessarily be obtained. All details concerning product specifications and terms of sale are available from 3M.



Renewable Energy Division
St. Paul, MN 55144-1000
1-866-499-8857
www.3M.com/windowfilm

3M is a trademark of 3M.
© 3M 2008. All rights reserved.
04/08 DMR #

3M™ Sun Control Window Film





PR 70X

Technical Data

Product Benefits

- High Visible Light Transmission, High Clarity, Extremely High Total Solar Energy Rejection
- No metals in the film, means no signal interference, no edge sealing needed, and no chance of corrosion
- Reduces air conditioning costs.
- Stay cooler by reducing excessive heat in warmer months.
- Reduces glare and eye discomfort.
- Excellent film for skylight applications
- Protects glass from graffiti
- Hydrophobic hardcoat helps to keep the exterior surface of the glass look cleaner
- Reduces the risk of thermal fracture
- Extend the life and vibrancy in the fabric of furniture and carpets.
- Reduces injury risk from flying glass.

Product Performance & Technical Data

PR70X								
	Single Pane		Tinted		Double Pane		Double tinted	
Film	1/4" Clear	PR70X	1/4" tint	PR70 X	Dual 1/4" Clear	PR70X	Dual 1/4" tint	PR70 X
Solar Heat Gain Coefficient	0.82	0.48	0.63	0.39	0.70	0.39	0.51	0.29
Visible Light Transmitted	89%	71%	53%	42%	79%	63%	47%	38%
Visible Light Reflected Interior	9%	7%	6%	5%	15%	14%	13%	13%
Visible Light Reflected Exterior	8%	7%	6%	6%	15%	12%	8%	7%
U Value	1.03	1.02	1.03	1.02	0.47	0.47	0.47	0.47
UV Block	38%	99.9%	NA	99.9%	NA	99.9%	NA	99.9%
Total Solar Energy Rejected	19%	52%	37%	61%	30%	61%	49%	71%
Glare Reduction	NA	20%	NA	20%	NA	20%	NA	21%
Heat Loss Reduction	NA	0%	NA	0%	NA	0%	NA	0%
Solar Heat Reduction	NA	41%	NA	39%	NA	45%	NA	43%

Important:

The information provided in this report is believed to be reliable; however, due to the wide variety of intervening factors, 3M does not warrant that the results will necessarily be obtained. All details concerning product specifications and terms of sale are available from 3M.



Renewable Energy Division
St. Paul, MN 55144-1000
1-866-499-8857
www.3M.com/windowfilm

3M is a trademark of 3M.
© 3M 2008. All rights reserved.
04/08 DMR #

3M™ Sun Control Window Film





PR 90X

Technical Data

Product Benefits

- Highest Visible Light Transmission Film, High Clarity, High Luminous Efficacy
- No metals in the film, means no signal interference, no edge sealing needed, and no chance of corrosion
- Reduces air conditioning costs.
- Stay cooler by reducing excessive heat in warmer months.
- Excellent film for skylight applications
- Protects glass from graffiti
- Hydrophobic hardcoat helps to keep the exterior surface of the glass look cleaner
- Reduces the risk of thermal fracture
- Extend the life and vibrancy in the fabric of furniture and carpets.
- Reduces injury risk from flying glass.
- Holds broken glass in place reducing the risk of injury

Product Performance & Technical Data

<u>PR90X</u>								
	Single Pane		Tinted		Double Pane		Double tinted	
Film	1/4" Clear	PR90X	1/4" tint	PR90X	Dual 1/4" Clear	PR90X	Dual 1/4" tint	PR90X
Solar Heat Gain Coefficient	0.82	0.64	0.63	0.50	0.70	0.56	0.51	0.41
Visible Light Transmitted	89%	88%	53%	53%	79%	78%	47%	47%
Visible Light Reflected Interior	9%	9%	6%	6%	15%	16%	13%	13%
Visible Light Reflected Exterior	8%	9%	6%	6%	15%	15%	8%	9%
U Value	1.03	1.02	1.03	1.02	0.47	0.47	0.47	0.47
UV Block	38%	99.9%	NA	99.9%	NA	99.9%	NA	99.9%
Total Solar Energy Rejected	19%	36%	37%	50%	30%	45%	49%	60%
Glare Reduction	NA	1%	NA	1%	NA	1%	NA	1%
Heat Loss Reduction	NA	0%	NA	0%	NA	1%	NA	0%
Solar Heat Reduction	NA	21%	NA	21%	NA	21%	NA	20%

Important:

The information provided in this report is believed to be reliable; however, due to the wide variety of intervening factors, 3M does not warrant that the results will necessarily be obtained. All details concerning product specifications and terms of sale are available from 3M.



Renewable Energy Division
St. Paul, MN 55144-1000
1-800-698-4595
www.3M.com/windowfilm

3M is a trademark of 3M.
© 3M 2008. All rights reserved.
04/08 DMR #

3M™ Sun Control Window Film Specifications

Specifications for 3M™ Sun Control Window Film Prestige Exterior Series

1.0 Scope

This specification is for an abrasion resistant solar control window film which when applied to the exterior window surface will reduce the gain of solar heat energy through the window. The film shall contain no metals. The film shall be called 3M™ Exterior Prestige Sun Control Window Film _____ [Series or Product Number].

2.0 Applicable Documents

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

The 1997 American Society for Heating, Refrigeration, and Air Conditioning Engineers (ASHRAE) Handbook of Fundamentals.

The American Society for Testing and Materials (ASTM) publication:

- ASTM E-308 Standard Recommended Practice for Spectrophotometry and Description of Color in CIE 1931 System
- NFRC 100/200/304 (FORMERLY ASTM E-903) Standard Methods of Test for Solar Absorbance, Reflectance and Transmittance of Materials Using Integrating Spheres
- ASTM D-1044 Standard Method of Test for Resistance of Transparent Plastics to Surface Abrasion (Taber Abrader Test)
- ASTM G-26 Standard Practice for Performing Accelerated Outdoor Weatherizing for Non-metallic Materials Using Concentrated Natural Sunlight
- ASTM E-84 Standard Method of Test for Surface Burning Characteristics of Building Materials

Window 5.2, A Computer Tool for Analyzing Window Thermal Performance, Lawrence Berkeley Laboratory

3.0 Requirements of the Film

3.1 Film Material: The film shall be an optically clear polyester film containing at least 220 layers and incorporating an acrylic pressure sensitive adhesive on one side and an acrylic abrasion resistant coating on the other. The film shall also incorporate Infrared absorbing carbon and/or metal oxide particles. The film shall be uniform without noticeable pin holes, streaks, thin spots, scratches, banding or other optical defects. The variation in total transmission across the width, at any portion along the length, shall not exceed 2% over the average. The film shall have a nominal thickness of 2.0 mils (0.002 inches). There shall be no evidence of coating voids. The film shall be identified as to Manufacturer of Origin (hereafter to be called Manufacturer).

3.2 Emissivity: The emissivity of the non-adhesive surface of the film shall be 0.78 nominal when measured using a Devices & Services Emissometer Model AE at or near room temperature. The Manufacturer shall provide laboratory data of emissivity and calculated window "U" Values for various outdoor temperatures based upon established calculation procedure defined by the 1997 ASHRAE Handbook of Fundamentals, ch. 29, or Lawrence Berkeley Laboratory Window 5.2 Computer Program available from:
<http://windows.lbl.gov/software/window/windo/html>.

Important:

The information provided in this report is believed to be reliable; however, due to the wide variety of intervening factors, 3M does not warrant that the results will necessarily be obtained. All details concerning product specifications and terms of sale are available from 3M.



Renewable Energy Division

St. Paul, MN 55144-1000

1-866-499-8857

www.3M.com/windowfilm

3M is a trademark of 3M.
© 3M 2008. All rights reserved.
04/08 DMR #

3M™ Sun Control Window Film Specifications

Specifications for 3M™ Sun Control Window Film Prestige Exterior Series

3.3 U Value: The U Value of the film applied to 1/4" (6mm) clear glass shall be 1.0 nominal when measured in accordance with test procedures described in 3.2 for Emissivity.

3.4 Transmission - Visible: When applied to 1/4" (6mm) clear glass, the luminous transmittance shall be _____ nominal when measured with an integrating sphere spectrophotometer as referenced by NFRC 100/200/304 (FORMERLY ASTM E-903) and calculated per ASTM E-308 using Standard Source "C" for average daylight.

3.5 Reflection – Visible, Exterior: When applied to 1/4" (6mm) clear glass, the total luminous reflection from the glass surface shall be _____ nominal when measured with an integrating sphere spectrophotometer as referenced by NFRC 100/200/304 (Formerly ASTM E-903) and calculated per ASTM E-308 using Standard CIE Source "C" for average daylight.

Reflection – Visible, Interior: When applied to 1/4" (6mm) clear glass, the total luminous reflection from the glass surface shall be _____ nominal when measured with an integrating sphere spectrophotometer as referenced by NFRC 100/200/304 (Formerly ASTM E-903) and calculated per ASTM E-308 using Standard CIE Source "C" for average daylight.

3.6 Rejected – Ultraviolet Light: When applied to 1/4" (6mm) clear glass, the total rejection of solar ultraviolet radiation of air mass = 2 over the spectral range of 3000 to 3800 angstroms shall be 99.9% minimum when measured with an integrating sphere spectrophotometer as referenced by NFRC 100/200/304 (FORMERLY ASTM E-903).

3.7 Rejected – Infrared Light: Film shall have an IR transmission of not more than 3% when measured between 900-1000 nanometers.

3.8 Luminous Efficacy: When applied to (6mm) clear glass, the luminous efficacy (Defined as the ratio of visible light transmission to Solar Heat Gain Coefficient) shall be _____ Nominal.

3.9 Shading Coefficient: When applied to 1/4" (6mm) clear glass, the shading coefficient shall be _____ nominal (_____ at 60 Degrees) as measured per NFRC 100/200/304 (Formerly ASTM E-903) and computed in accordance with the established procedures defined by The ASHRAE Handbook of Fundamentals.

3.10 Adhesive System: The film shall be supplied with an optically clear pressure sensitive weather able acrylic adhesive applied uniformly over the surface opposite the abrasion resistant coating.

3.11 Flammability: The Manufacturer shall provide independent test data showing that equivalent window film shall meet the requirements of a Class A Interior Finish for Building Materials for both Flame Spread Index and Smoke Development Values per ASTM E-84.

3.12 Abrasion Resistance: The Manufacturer shall provide independent test data showing that the film shall have a surface coating that is resistant to abrasion such that, less than 5% increase of transmitted light haze will result in accordance with ASTM D-1044 using 50 cycles, 500 grams weight, and the CS10F Calbrase Wheel.

Important:

The information provided in this report is believed to be reliable; however, due to the wide variety of intervening factors, 3M does not warrant that the results will necessarily be obtained. All details concerning product specifications and terms of sale are available from 3M.



Renewable Energy Division
St. Paul, MN 55144-1000
1-866-499-8857
www.3M.com/windowfilm

3M is a trademark of 3M.
© 3M 2008. All rights reserved.
04/08 DMR #

3M™ Sun Control Window Film Specifications

Specifications for 3M™ Sun Control Window Film Prestige Exterior Series

4.0 Requirements of the Authorized Dealer/Applicator (ADA)

4.1 The ADA shall provide documentation that the ADA is authorized by the Manufacturer to install window film as per the Manufacturer's specifications and in accordance with specific requests as to be determined and agreed to by the customer.

4.2 Authorization of dealership may be verified through the company's ADA Identification Number.

4.3 The ADA will provide a commercial building reference list of ____ (#) properties where the ADA has installed window film. This list will include the following information:

- * Name of building
- * The name and telephone number of a management contact
- * Type of glass
- * Type of film
- * Amount of film installed
- * Date of completion

4.4 Upon request, the ADA will provide a Glass Stress Analysis of the existing glass and proposed glass/film combination as recommended by the film Manufacturer.

4.5 Upon request, the ADA will provide an application analysis to determine available energy cost reduction and savings.

5.0 Requirements of the Manufacturer

5.1 The Manufacturer will insure proper quality control during production, shipping and inventory, clearly identify and label each film core with the product designation and run number.

5.2 Materials shall be manufactured by:

3M Renewable Energy Division
3M Center Building 235
St. Paul, MN 55144-1000

5.3 3M Authorized Dealer Point of Contact:

John A. Susnik, Sunray Window Films 800-295-8468

6.0 Application

6.1 **Examination:** Examine glass surfaces to receive new film and verify that they are free from defects and imperfections which will affect the final appearance. Correct and/or note all such deficiencies to the owner prior to commencing film application.

6.2 **Preparation:**

- d. The window and window framing will be cleaned thoroughly with a neutral cleaning solution. The exterior surface of the window glass shall be bladed with industrial razors to insure the removal of any foreign contaminants.

Important:

The information provided in this report is believed to be reliable; however, due to the wide variety of intervening factors, 3M does not warrant that the results will necessarily be obtained. All details concerning product specifications and terms of sale are available from 3M.



Renewable Energy Division
St. Paul, MN 55144-1000
1-866-499-8857
www.3M.com/windowfilm

3M is a trademark of 3M.
© 3M 2008. All rights reserved.
04/08 DMR #

3M™ Sun Control Window Film

Specifications

Specifications for 3M™ Sun Control Window Film Prestige Exterior Series

6.3 Installation: The film shall be applied as to the specifications of the Manufacturer by an ADA.

- h. Materials will be delivered to the job site with the manufacturer's labels intact and legible.
- i. Film edges shall be cut neatly and square at a uniform distance of 1/8" (3mm) to 1/16" (1,5mm) of the window sealing device.
- j. Edge Seal – None required. 3M Sun Control Window Film Exterior Prestige Series do not contain metals. *Except near edges where water could pool for extended time periods, such as the bottom surface of a non-vertical glass that does not have adequate draining mechanisms, or skylights where water can pool at the bottom surface. Edge sealing is not required around the entirety of the window, solely where the water can pool.
- k. Water and film slip solution only will be used on the window glass and adhesive to facilitate the proper positioning of the film.
- l. To insure efficient removal of excess water from the underside of the film and to maximize bonding of the pressure sensitive adhesive, polyplastic bladed squeegees will be utilized.
- m. Upon completion, the film may have a dimpled appearance from residual moisture. Said moisture shall, under reasonable weather conditions, dry flat with no moisture dimples within a period of 30 calendar days when viewed under normal viewing conditions.
- n. After installation, any left over material and/or debris will be removed and the work area will be returned to original condition. ADA will protect the film before, during and after the installation.

7.0 Cleaning

The film may be washed using common window cleaning solutions, including ammonia solutions, 30 days after application. Abrasive type cleaning agents and bristle brushes which could scratch the film must not be used. Synthetic sponges or soft cloths are recommended.

8.0 Warranty

Films Covered: Exterior Prestige 90, Exterior Prestige 70, Exterior Prestige 40.

8.1 The application shall be warranted by the film manufacturer (3M) for a period of five (5) years for vertical applications and (3) years for non-vertical applications in that the film will maintain solar reflective properties without cracking, crazing, delaminating, bubbling, peeling or discoloration. In the event that the product is found to be defective under warranty, the seller will replace such quantity of the film proved to be defective. 3M will also provide removal and reapplication labor free of charge for up to 1 year from the date of installation.

Section	Title	3M Window Films		
		PR40X	PR70X	PR90X
1	Film			
3.1	Thickness (mils)	>2.0	>2.0	>2.0
	(inches)	0.002	0.002	0.002
3.3	U value	1.02	1.02	1.02
3.4	Visible Light Transmission	42%	71%	88%
3.5	Visible Light Reflection - Exterior	6%	7%	9%
	Visible Light Reflection - Interior	5%	7%	9%
3.6	Ultraviolet Rejection	99.9%	99.9%	99.9%
3.7	Infrared Rejection*	97%	97%	97%
3.8	Luminous Efficacy	1.1	1.5	1.4
3.9	Shading Coefficient Coefficient - 90 degrees (normal incidence)	0.44	0.55	0.74
3.9.1	Total Solar Energy Rejected -90 degrees (normal incidence)	61%	52%	36%
3.9.2	TSER - 60 Degree Angle	67%	61%	49%

Note: Performance based upon ¼ clear glass *IR rejection measured from 900-1000nm

Important:

The information provided in this report is believed to be reliable; however, due to the wide variety of intervening factors, 3M does not warrant that the results will necessarily be obtained. All details concerning product specifications and terms of sale are available from 3M.



Renewable Energy Division

St. Paul, MN 55144-1000

1-866-499-8857

www.3M.com/windowfilm

3M is a trademark of 3M.
© 3M 2008. All rights reserved.
04/08 DMR #