

# SPECIFICATIONS FOR 3M™ PRESTIGE SUN CONTROL WINDOW FILMS

## 1.0 Scope

This specification is for an abrasion resistant solar control window film which when applied to the interior 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™ Prestige Sun Control Window Film PR 70.

## 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

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.ibl.gov/software/window/windo/html>.

- 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 68% nominal when measured with an integrating sphere spectrophotometer as referenced by 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 9% nominal when measured with an integrating sphere spectrophotometer as referenced by 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 9% nominal when measured with an integrating sphere spectrophotometer as referenced by 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 transmission 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 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 1/4" (6mm) clear glass, the luminous efficacy (Defined as the ratio of visible light transmission to shading coefficient) shall be 1.17 Nominal.
- 3.9 **Shading Coefficient:** When applied to 1/4" (6mm) clear glass, the shading coefficient shall be 0.58 nominal as measured per ASTM E-903 and computed in accordance with the established procedures defined by The ASHRAE Handbook of Fundamentals.
- 3.10 **Total Solar Energy Rejected – normal and 60 Degree Angle:** When applied to 1/4" (6mm) clear glass, the TSER shall be 50% nominal (59% at 60 Degrees) as measured per ASTM E-903 and computed in accordance with the established procedures defined by The ASHRAE Handbook of Fundamentals.
- 3.11 **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.
- 3.12 **Solar Heat Gain Coefficient:** When applied to 1/4" (6mm) clear glass the solar heat gain coefficient shall be 0.42 nominal as measured per National Fenestration Rating Council and computed in accordance with the established procedures defined by the NFRC.
- 3.13 **Flammability:** The Manufacturer shall provide independent test data showing that the 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.
- 3.14 **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.

#### **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 3M I.D. Number.
- 4.3 The ADA will provide a commercial building reference list of 5 properties where the ADA has installed window film. This list will include the following information: (See Appendix A)
  - \* 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 Building Safety Solutions Department (BSSD)
  - 3M Center Building 223-2S-24
  - St. Paul, MN 55144-1000
- 5.3 3M BSSD Point of Contact:
  - Michael Hassenauer, 651-737-1053

#### **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:**
  - a. The use of protective tarps and/or drop cloths to cover office interior furnishing near the window is a recommended practice.

- b. The window and window framing will be cleaned thoroughly with a neutral cleaning solution. The inside surface of the window glass shall be bladed with industrial razors to insure the removal of any foreign contaminants.
- c. Toweling or other absorbent material shall be placed on the window sill or sash to absorb moisture generated by the film application process.

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

- a. Materials will be delivered to the job site with the manufacturer's labels intact and legible.
- b. 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.
- c. Edge Seal – None required. 3M Prestige Window Film do not contain metals.
- d. Water and film slip solution only will be used on the window glass and adhesive to facilitate the proper positioning of the film.
- e. 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.
- f. 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.
- g. After installation, any left over material and/or debris will be removed and the work area will be returned to original condition. Use all necessary means to 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**

**Film Covered: Prestige 70**

- 8.1 The application shall be warranted by the film manufacturer (3M) for a period of Fifteen (15) years 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, and will additionally provide the removal and reapplication labor free of charge.
- 8.2 The film manufacturer (3M) also warrants against glass failure (maximum value \$500 per window) due to thermal shock fracture of glass provided the film is applied to recommended types of glass and the failure occurs within sixty (60) months from the start of application. Any glass failure must be reviewed by the film manufacturer (3M) prior to replacement.

	<u>Title</u>	<b>3M</b>	<b>Prestige</b>	<b>Window</b>	<b>Films</b>
1.0	Scope ( <b>Prestige Films</b> )	<b><u>PR 70</u></b>			
3.1	Thickness (mils) (inches)	>2.0 0.0020			
3.2	Emissivity	0.78			
3.3	U Value	0.99			
3.4	Visible Light Transmission	68%			
3.5	Visible Reflection – Exterior	9%			
	Visible Reflection – Interior	9%			
3.6	Ultraviolet Rejected	>99.9%			
3.7	Infrared Energy Rejected	97%			
3.8	Luminous Efficacy	1.17			
3.9	Shading Coefficient – at 90 Degrees (normal incidence)	0.58			
3.10	Total Solar Energy Rejected at 90 Degrees (normal incidence)	50%			
3.11	TSER – 60 Degree Angle	59%			
3.12	Solar Heat Gain Coefficient	0.42			

**Note:** Performance based upon 1/4 "clear glass