3M™ Window Film
Specifications
Specifications For 3M™ Sun Control Window Film Ceramic Series

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 a ceramic coating. The film shall be called 3M™ Ceramic 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 Spectophotometry 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 material shall be an optically clear ceramic coated polyester film which may be laminated to a clear polyester film. There must be an acrylic abrasion resistant coating over the surface of the film for enhanced durability. The film color is derived from a ceramic coating and the product will not contain dyed polyester. The metallic coating shall be uniform without noticeable pin holes, streaks, thin spots, scratches or banding. 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 _____ mils (_____ inches). The density of the film across the web is not to exceed plus or minus 2%. 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.

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

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3.3 **U Value:** The U Value of the film applied to 1/4" (6mm) clear glass shall be1.0 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 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 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 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 % minimum when measured with an integrating sphere spectrophotometer as referenced by ASTM E-903.

3.7 **Luminous Efficacy:** When applied to ?" (6mm) clear glass, the luminous efficacy (Defined as the ratio of visible light transmission to shading coefficient) shall be _____ Nominal.

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

3.9 **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.

3.10 **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.

3.11 **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.

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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 RED Point of Contact:

Bill Pettit LEED AP 651-736-1549

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

e. 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.

f. Toweling or other absorbent material shall be placed on the window sill or sash to absorb moisture generated by the film application process.

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