

Specifications for 3M™ Sun Control Window Film Low E

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 be called 3M™ Sun Control Window Film Low E.

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 1985 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-90 Standard Practice for Performing Accelerated Outdoor Weathering for Nonmetallic Materials Using Concentrated Natural Sunlight
- ASTM E-84 Standard Method of Test for Surface Burning Characteristics of Building Materials

Window, 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 metallized 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 metal 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 conform to NFRC certification requirements. The film shall have a nominal thickness of ____ mils (____ 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 ____ 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 1985 ASHRAE Handbook of Fundamentals, ch. 27, or Lawrence Berkeley Laboratory Window 4.0 Computer Program.

3.3 U Value: The U Value of the film applied to 1/4" (6mm) clear glass shall be ____ 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: 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 Transmission - 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 not exceed ____ when measured with an integrating sphere

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spectrophotometer as referenced by NFRC 100/200/304 (Formerly ASTM E-903).

3.7 Shading Coefficient: When applied to 1/4" (6mm) clear glass, the shading coefficient shall be _____ nominal when solar energy transmittance and reflection are measured per NFRC 100/200/304 (Formerly ASTM E-903) and the shading coefficient is computed in accordance with the established procedures defined by The ASHRAE Handbook of Fundamentals.

3.8 Adhesive System: The film shall be supplied with a pressure sensitive weatherable acrylate adhesive applied uniformly over the surface opposite the abrasion resistant coating. A water soluble detackifier shall be incorporated over the pressure sensitive adhesive to facilitate handling. The adhesive shall be essentially optically flat and the film itself shall not appear distorted when viewed from a distance of ten feet (3 m) at angles up to 45 degrees from either side of the glass.

3.9 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.

3.10 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 100 cycles, 500 grams weight, and the CS10F Calibrase 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 ten (10) 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 ensure 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 Commercial Solutions Division
3M Center Building 280
St. Paul, MN 55144-1000

Materials shall be provided by:

Energy Products Distribution (EPD)
Manny Hondroulis
mhondroulis@epdwindowfilm.com
9223 Harford Rd
Baltimore, MD 21234
www.epdwindowfilm.com

5.3 3M CSD Point of Contact:

Jennifer Daly 651-737-1281

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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 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 ensure the removal of any foreign contaminants.
- b. Toweling or other absorbent material shall be placed on the window sill or sash to absorb moisture accumulation generated by the film application.

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. To minimize waste, the film will be cut to specification utilizing a vertical dispenser designed for that purpose. 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. Clear, clean water will be used to remove the water-soluble overcoat that protects the pressure sensitive adhesive. Water and film slip solution shall be used on the window glass to facilitate the proper positioning of the film
- d. To ensure efficient removal of excess water from the underside of the film and to maximize bonding of the pressure sensitive adhesive, polyplastic bladed squeegees shall be used.
- e. 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.
- f. After installation, any leftover 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: LE20, LE35, and LE70

8.1 The application shall be warranted by the film manufacturer (3M) for a period of Fifteen (12) 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.

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Section	Title	3M Window Films		
		LE20	LE35	LE70
1	Film	LE20	LE35	LE70
3.1	Thickness (mils)	1.5	1.5	2.5
	(inches)	0.0015	0.0015	0.0025
3.3	U value	0.79	0.85	0.78
3.4	Visible Light Transmission	20%	30%	74%
3.5	Visible Light Reflection - Exterior	52%	54%	16%
	Visible Light Reflection - Interior	58%	60%	17%
3.6	Ultraviolet Rejection	99%	99%	99%
3.7	Shading Coefficient - 90 degrees (normal incidence)	0.28	0.29	0.62

Note: Performance based upon ¼ clear glass

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Health and Safety

When handling any chemical products, read the manufacturers' container labels and the Safety Data Sheets (SDS) for important health, safety and environmental information. To obtain SDS sheets for 3M products go to [3M.com/SDS](https://www.3m.com/SDS), or by mail or in case of an emergency, call 1-888-364-3577 or 1-651-737-6501. When using any equipment, always follow the manufacturers' instructions for safe operation.

Technical Information

Technical information and data, recommendations, and other statements provided by 3M are based on information, tests, or experience which 3M believes to be reliable, but the accuracy or completeness of such information is not guaranteed. Such technical information and data are intended for persons with knowledge and technical skills sufficient to assess and apply their own informed judgment to the information. The typical values shown should not be used for the purpose of specification limits. If you have questions about this Product, contact the Customer Service Department at 1-800-852-9722.

Product Use

Many factors beyond 3M's control and uniquely within user's knowledge and control can affect the use and performance of a 3M product in a particular application. Given the variety of factors that can affect the use and performance of a 3M product, user is solely responsible for evaluating the 3M product and determining whether it is fit for a particular purpose and suitable for user's method of application.

Warranty

3M warrants that each 3M product will be free from defects in material and manufacture for the length of the product warranty. 3M MAKES NO OTHER EXPRESS OR IMPLIED WARRANTIES, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

Limited Remedy

If a 3M product does not conform to this warranty, the sole and exclusive remedy is, at 3M's option, replacement of the 3M product or refund of the purchase price.

No Extension of Warranty

In the case of an approved warranty claim, the replacement Product will carry only the remaining term of the original warranty period.

Limitation of Liability

Except where prohibited by law, 3M will not be liable for any loss or damage arising from the 3M product, whether direct, indirect, special, incidental or consequential, regardless of the legal theory asserted.

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