3M™ Safety & Security Window Film
Safety S40 (SH4CLARL)
Technical Data

Product Features & Benefits

- Optically clear, 4-mil (0.10 mm) thick film for application to interior glass surface
- Provides shatter resistance to protect from broken glass hazards caused by seismic activity, spontaneous glass breakage, and other low force impact events
- Can be combined with 3M Impact Protection Attachment systems for additional safety and security
- Exhibits strong adhesion to glass and shock absorbing properties
- Protective hardcoat provides scratch resistance and durability
- Protects from the harmful effects of UV light and reduces fading of interior furnishings
- Easily cleaned with typical window cleaning solutions

Product Performance & Technical Data

Safety S40								
	Single Pane		**Tinted**		**Double Pane**		**Double tinted**	
Film	1/4" Clear	Safety S40	1/4" tint	Safety S40	Dual 1/4" Clear	Safety S40	Dual 1/4" tint	Safety S40
Solar Heat Gain Coefficient	0.82	0.82	0.63	0.59	0.70	0.68	0.51	0.46
Visible Light Transmitted	89%	87%	47%	47%	79%	77%	47%	45%
Visible Light Reflected Interior	9%	8%	6%	6%	15%	15%	13%	14%
Visible Light Reflected Exterior	8%	8%	6%	6%	15%	15%	8%	14%
U Value	1.03	1.03	1.03	1.03	0.47	0.47	0.47	0.47
UV Block	38%	99%	NA	99%	NA	99%	NA	99%
Total Solar Energy Rejected	19%	19%	37%	41%	30%	32%	49%	54%
Glare Reduction	NA	2%	NA	1%	NA	3%	NA	5%
Heat Loss Reduction	NA	0%	NA	0%	NA	0%	NA	0%
Solar Heat Reduction	NA	0%	NA	6%	NA	3%	NA	9%

Film Properties* (nominal)

Product	Film Thickness	Single or Multi-ply	Tensile Strength	Break Strength	Elongation at Break	Abrasion Resistance
Safety S40	0.004”	Single	25,000 psi	100 lbs/in	>125 %	< 5% haze increase

*not for specification purposes

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

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Specifications - Safety and Security Window Film
3M Safety S40

1.0 Scope

This specification is for an optically clear glass shatter resistant and abrasion resistant window film which, when applied to the interior window surface, will help hold broken glass together and reduce the ultra-violet light that normally would enter through the window. This is a basic safety and security window film that may be useful as an increased measure of protection against low force impact situations, general glass fragment retention, spontaneous glass breakage, seismic events, and limited safety glazing situations. Certain applications may require the film be used in conjunction with a film attachment system. The film shall be called **3M Safety S40 Safety and Security Window Film**.

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 National Standards Institute (ANSI).

ANSI Z97.1 Specification for Safety Glazing Material used in Buildings

The American Society for Testing and Materials (ASTM):

- 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-882 Standard Test Method for Tensile Properties of Thin Plastic Sheeting
- ASTM D-1044 Standard Method of Test for Resistance of Transparent Plastics to Surface Abrasion (Taber Abrader Test)
- ASTM D-2582 Standard Test Method for Puncture-Propagation Tear Resistance of Plastic Film and Thin Sheeting
- ASTM D-4830 Standard Test Methods for Characterizing Thermoplastic Fabrics Used in Roofing and Waterproofing.
- ASTM G-90 Standard Practice for Performing Accelerated Outdoor Weatherizing for Non-metallic Materials Using Concentrated Natural Sunlight
- 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
- ASTM D-1004 Standard Method of Test for Resistance of Transparent Plastics to Tearing (Graves Tear Test)
- ASTM E-1886 Standard Test Method for Performance of Exterior Windows, Curtain Walls, Doors, and Impact Protective Systems Impacted by Missile(s) and Exposed to Cyclic Pressure Differentials
- ASTM E-1996 Standard Specification for Performance of Exterior Windows, Curtain Walls, Doors and Impact Protective Systems Impacted by Windborne Debris in Hurricanes
- ASTM F-1642 Standard Method of Test for Glazing and Glazing Systems Subject to Airblast Loadings, as adapted by the U.S. Government GSA Test Standard Protocols
- ASTM F-2912 Standard Specification for Glazing and Glazing Systems Subjected to Airblast Loadings

The Consumer Products Safety Commission (CPSC) 16 CFR, Part 1201, Safety Standard for Architectural Glazing Material

GSA-TS01-2003 General Services Adminstration Standard Test for Glazing and Glazing Systems Subject to Airblast Loadings

Window 4.1. 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 consist of an optically clear polyester film with a durable abrasion resistant coating over one surface, and a UV stabilized pressure sensitive adhesive on the other. The film shall have a nominal thickness of 4 mils (0.004 inches). The film shall be identified as to Manufacturer of Origin (hereafter to be called Manufacturer).

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3.2 **Film Properties (nominal)**:
a) Tensile Strength (ASTM D882): 25,000 psi
b) Break Strength (ASTM D882): 25,000 psi (100 lbs per inch width)
c) Percent Elongation at Break (ASTM D882): >125%
d) Percent Elongation at Yield (ASTM D882): greater than 100%

3.3 **Solar Performance Properties**: film applied to ¼" thick clear glass
a) Visible Light Transmission: 87%
b) Visible Reflection: not more than 10%
c) Ultraviolet Trasmission: less than 1% (300 – 380 nm)
d) Solar Heat Gain Coefficient: 0.82

3.4 **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 Smoked Development Values per ASTM E-84

3.5 **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 Calbrase Wheel.

3.6 **Adhesive System**: The film shall be supplied with a high mass pressure sensitive weatherable acrylate adhesive applied uniformly over the surface opposite the abrasion resistant coated surface. The adhesive shall be essentially optically flat and shall meet the following criteria:
a. Viewing the film from a distance of ten feet at angles up to 45 degrees from either side of the glass, the film itself shall not appear distorted.
b. It shall not be necessary to seal around the edges of the applied film system with a lacquer or other substance in order to prevent moisture or free water from penetrating under the film system.

3.7 **Impact Resistance for Safety Glazing**: The film, when applied to either side of the window glass, shall pass a 150 ft-lb impact when tested according to 16 CFR CPSC Part 1201 (Category 1) and ANSI Z97.1 (Class B).

4.0 Requirements of the Authorized Dealer/Applicator (ADA)

4.1 The ADA shall provide documentation that the ADA is certified by the Manufacturer of the window film to install said 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 ID 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.

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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 The Manufacturer will, upon request and pre-approval, provide 100% financing for the complete installation of the window film to the end-user customer in either an installment purchase or lease purchase format to be decided upon by customer.

5.3 Materials shall be manufactured by:

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

5.4 Point of Contact: John Susnik, Sunray 800-295-8468. Email: john@sunrayfilms.com.

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 all such deficiencies before starting 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 scraped with stainless steel razor blades with clean, sharp edges to ensure the removal of any foreign contaminants without damages the glass surface.
b. Drop cloths 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" (3 mm) to 1/16" (1.6 mm) of the window-sealing device.
c. Film shall be wet-applied using clean water and slip solution to facilitate positioning of the film onto glass.
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 will be utilized.
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 left over material 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

a) The application shall be warranted by the film manufacturer (3M) for a period of _____ years in that the film will maintain solar reflective properties without cracking, crazing, delaminating, peeling, or discoloration. In the event that the product is found to be defective under warranty, the film manufacturer (3M) will replace such quantity of the film proved to be defective, and will additionally provide the removal and reapplication labor free of charge.

b) 8.2 The film manufacturer (3M) also warrants against glass failure due to thermal shock fracture of the glass window unit (maximum value $500 per window) 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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