3M™ Safety & Security Window Film
Ultra Night Vision S25 (S25NVAR400)
Technical Data

Product Features & Benefits

- Combination safety / solar microlayered control film exhibiting tear resistance and heat rejection properties
- For application to interior glass surfaces; warm, natural hue reduces glare and eye discomfort
- Combination of low VLT for daytime privacy with low visible light interior reflectance to optimize the nighttime view
- Solar control properties enable a reduction in air conditioning costs and increased comfort during warm periods
- Excellent heat rejection on double pane windows
- Provides shatter resistance to protect from broken glass hazards caused by seismic activity, spontaneous glass breakage, and other impact events
- Broad range of application use, including bomb blast mitigation, windstorm protection, and safety glazing
- Can be combined with 3M Impact Protection Attachment systems for additional safety and security
- Protects from the harmful effects of UV light and reduces fading of interior furnishings

Product Performance & Technical Data

Ultra NV S25								
	Single Pane		**Tinted**		**Double Pane**		**Double tinted**	
Film	1/4" Clear	Ultra NV S25	1/4" tint	Ultra NV S25	Dual 1/4" Clear	Ultra NV S25	Dual 1/4" tint	Ultra NV S25
Solar Heat Gain Coefficient	0.82	0.38	0.63	0.35	0.70	0.47	0.51	0.36
Visible Light Transmitted	89%	27%	53%	16%	79%	25%	47%	15%
Visible Light Reflected Interior	9%	12%	6%	12%	15%	13%	13%	13%
Visible Light Reflected Exterior	8%	23%	6%	11%	15%	27%	8%	13%
U Value	1.03	0.97	1.03	0.97	0.47	0.46	0.47	0.46
UV Block	38%	99%	NA	99%	NA	99%	NA	99%
Total Solar Energy Rejected	19%	63%	37%	65%	30%	53%	49%	64%
Glare Reduction	NA	69%	NA	69%	NA	69%	NA	69%
Heat Loss Reduction	NA	6%	NA	6%	NA	3%	NA	3%
Solar Heat Reduction	NA	54%	NA	44%	NA	33%	NA	29%

Film Properties* (nominal)

Product	Film Thickness	Single or Multi-ply	Tensile Strength	Break Strength	Elongation at Break	Graves Area Tear Resistance	Puncture Propagation Tear Resistance	Young's Modulus	Abrasion Resistance
Ultra Night Vision S25	0.006"	Multi (3)	30,000 psi	120 lbs/in	>125 %	780 lbs%	7.5 lbf	<500 kpsi	< 5% haze increase

*not for specification purposes

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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04/08 DMR #

Specifications
3M Ultra Night Vision S25 Safety and Security Window Film

1.0 Scope

This specification is for a combination safety and security window film with sun control: a glass shatter resistant and abrasion resistant window film which, when applied to the interior window surface, will help hold broken glass together, reduce the ultra-violet light transmission, and reduce the solar heat gain of solar energy through the window. This is an easily applied tear-resistant safety and security window film with sun control, exhibiting low internal reflectivity, which is useful for increased measure of protection in a broad range of applications, including basic glass fragment retention, spontaneous glass breakage, seismic preparedness, and safety glazing applications, protection from windborne debris, and bomb blast mitigation. Certain applications may require the film be used in conjunction with a film attachment system. The film shall be called **3M Ultra Night Vision S25 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, consisting of 28 co-extrdued microlayers, laminated to a metalized multilayered polyester film for added color and sun control performance. The film has a durable acrylic abrasion resistant coating over one surface, and a UV stabilized pressure sensitive adhesive on the other. The film color is derived from the metal coating and will not contain dyed polyester. The film shall have a nominal thickness of 6 mils (0.006 inches). There shall be no evidence of coating voids. The film shall be identified as to Manufacturer of Origin (hereafter to be called Manufacturer).

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3M Ultra Night Vision S25 Safety and Security Window Film

3.2 **Film Properties (nominal):**
a) Tensile Strength (ASTM D882): 30,000 psi (60 lbs per inch width)
b) Break Strength (ASTM D882): 30,000 psi (120 lbs per inch width)
c) Percent Elongation at Break (ASTM D882): 125%
d) Percent Elongation at Yield (ASTM D882): greater than 100%
e) Yield Strength at 3% Elongation: 12,000 psi (24 lbs per inch width)
f) Graves Tear Resistance (ASTM D1004, maximum force): 13 lbs
g) Graves Area Tear Resistance (ASTM D1004): 780 lbs%
h) Puncture Propagation Tear Resistance (ASTM D2582): 7.5 lbf
i) Young's Modulus (ASTM D882): 500 kpsi

3.3 **Solar Performance Properties:** film applied to ¼" thick clear glass
a) Visible Light Transmission: 27%
b) Visible Reflection: not more than 28%
c) Ultraviolet Trasmission: less than 1% (300 – 380 nm)
d) Solar Heat Gain Coefficient: 0.38

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 400 ft-lb impact when tested according to 16 CFR CPSC Part 1201 (Category 2) and ANSI Z97.1 (Class A, Unlimited) and shall pass the accelerated weathering test requirements for both tensile strength and peel strength.

3.8 **Windborne Debris Protection:** per ASTMs E1886 / E1996
a. Film shall pass impact of Medium Large Missile "C" and withstand subsequent pressure cycling (per ASTMs E 1996 and E 1886) at 70 psf Design pressure with use of 3M Impact Protection Adhesive attachment system.
b. Film shall pass impact of Small Missile "A" and withstand subsequent pressure cycling (per ASTMs E 1996 and E 1886) at 50 psf Design Pressure with use of 3M Impact Protection Adhesive attachment system.

3.9 **Bomb Blast Mitigation:**
a. GSA Rating of "3B" (Low Hazard) with minimum blast pressure of 4 psi and 28 psi*msec blast impulse

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.

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Specifications
3M Ultra Night Vision S25 Safety and Security Window Film

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 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. Film adhesive shall be thoroughly washed with slip solution prior to application to glass to ensure removal of adhesive overcoat detackifier. Refer to 3M Technical Bulletin 98-0150-0197-1.
e. 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.
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 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.

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3M Ultra Night Vision S25 Safety and Security Window Film

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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3M™ Safety & Security Window Film
Safety S70 (SH7CLARL)
Technical Data

Product Features & Benefits

- Optically clear, 7-mil (0.18 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 impact events
- Typical applications include bomb blast mitigation and safety glazing
- 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 S70								
	Single Pane		**Tinted**		**Double Pane**		**Double tinted**	
Film	1/4" Clear	Safety S70	1/4" tint	Safety S70	Dual 1/4" Clear	Safety S70	Dual 1/4" tint	Safety S70
Solar Heat Gain Coefficient	0.82	0.79	0.63	0.59	0.70	0.68	0.51	0.46
Visible Light Transmitted	89%	86%	47%	47%	79%	77%	47%	43%
Visible Light Reflected Interior	9%	9%	6%	6%	15%	16%	13%	8%
Visible Light Reflected Exterior	8%	9%	6%	6%	15%	16%	8%	8%
U Value	1.03	1.03	1.03	1.03	0.47	0.47	0.47	0.47
UV Block	38%	98%	NA	99%	NA	99%	NA	99%
Total Solar Energy Rejected	19%	21%	37%	41%	30%	32%	49%	54%
Glare Reduction	NA	3%	NA	1%	NA	3%	NA	9%
Heat Loss Reduction	NA	0%	NA	0%	NA	0%	NA	0%
Solar Heat Reduction	NA	3%	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 S70	0.007"	Single	25,000 psi	175 lbs/in	>125 %	< 5% haze increase

*not for specification purposes

Important:
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Specifications - Safety and Security Window Film
3M Safety S70

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 film is useful as an increased measure of protection for a variety of applications including general glass fragment retention, spontaneous glass breakage, seismic preparedness, and safety glazing applications, and bomb blast mitigation. Certain applications may require the film be used in conjunction with a film attachment system. The film shall be called **3M Safety S70 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 7 mils (0.007 inches). The film shall be identified as to Manufacturer of Origin (hereafter to be called Manufacturer).

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Specifications - Safety and Security Window Film
3M Safety S70

3.2 **Film Properties (nominal)**:
a) Tensile Strength (ASTM D882): 25,000 psi
b) Break Strength (ASTM D882): 25,000 psi (175 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: 86%
b) Visible Reflection: not more than 10%
c) Ultraviolet Trasmission: less than 1% (300 – 380 nm)
d) Solar Heat Gain Coefficient: 0.79

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 400 ft-lb impact when tested according to 16 CFR CPSC Part 1201 (Category 2) and ANSI Z97.1 (Class A, Unlimited).

3.8 **Bomb Blast Mitigation:**
a. GSA Rating of "3B" (Low Hazard) with minimum blast load of 10 psi overpressure and 89 psi*msec blast impulse

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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Specifications - Safety and Security Window Film
3M Safety S70

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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3M™ Scotchshield™ Safety and Security Window Film

Ultra S800

Technical Data

Product Features & Benefits

- Micro-layered film designed for tear resistance
- Optically clear
- Applies to interior glass surfaces
- Helps protect from broken glass hazards
- Helps protect against damaging effects of UV light

Suggested Applications

- Bomb Blast Mitigation
- Deterring Break and Entry
- Safety Glazing
- Spontaneous Glass Breakage
- Seismic Preparedness

Performance Testing*

Method	Glass Substrate	Film Attachment	Rating	
Safety Glazing / Impact Resistance				
16 CFR 1201	¼" & 1/8" annealed	--	Category 2, 400 ft-lbs	
ANSI Z97.1			Class A (Unlimited), 400 ft-lbs	
Missile Impact and Pressure Cycling				
ASTMs E1886 / E1996	¼" tempered	IPA	Large Missile C, +/- 75 psf	
ASTM E330	3/16" tempered		+/- 100 psf	
Blast Mitigation			**Blast Load**	**Rating**
GSA TS01-2003 / ASTM F1642	¼" annealed	IPA	6 psi, 42 psi*msec	GSA Level 2 / ASTM "Minimal Hazard"
		IPP	7 psi, 42 psi*msec	GSA Level 2 / ASTM "Minimal Hazard"
	¼" tempered	IPA	6 psi, 42 psi*msec	GSA Level 2 / ASTM "No Hazard"
		IPP	7 psi, 42 psi*msec	GSA Level 2 / ASTM "Minimal Hazard"
	1" double pane (annealed)	IPA	10 psi, 80 psi*msec	GSA Level 2 / ASTM "No Hazard"
		IPP	9 psi, 60 psi*msec	GSA Level 2 / ASTM "Minimal Hazard"

Film Properties* (nominal)

Film Thickness	8 mils
Film Construction	Micro-layered
Tensile Properties (ASTM D882)	
Tensile Strength	27,000 psi
Break Strength	215 lbs/in
Elongation at Break	95%
Yield Strength	15,000 psi
Elongation at Yield	8%
Modulus	575 kpsi

Graves Area Tear Resistance (ASTM D1004)	1,200 lbs%
Puncture-Propagation-Tear Resistance (ASTM D2582)	9.5 lbf
Puncture Strength (ASTM D4830)	185 lbf
Abrasion Resistance (ASTM D1044)	3% Δ haze
Peel Strength (ASTM D3330)	6.1 lb/in
Flammability (ASTM E84)	Class A
Solar Properties – *film applied to ¼" clear glass*	
Visible Light Transmitted	87%
UV Light Rejected	99.9%

*not for specification purposes

Important:
This product is not approved in the State of Florida for use as hurricane, windstorm, or impact protection from wind-borne debris from a hurricane or windstorm. In compliance with Florida Statute 553.842, this product may not be advertised, sold, offered, provided, distributed, or marketed in the State of Florida as hurricane, windstorm, or impact protection from wind-borne debris from a hurricane or windstorm.

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.

3M

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

4 mil Clear

MECHANICAL PROPERTIES

Thickness	4 mil
Tensile Strength at Break	28,500 PSI
Break Strength	112 lb/inch
Elongation at Break	125 %
Peel Strength	7 lb/inch

OPTICAL & SOLAR PROPERTIES

	3mm Single
Visible Light Transmitted	89%
Visible Light Reflected (Int)	10%
Visible Light Reflected (Ext)	10%
Ultra Violet Block	97%
Total Solar Energy Reflected	9%
Total Solar Energy Transmitted	81%
Total Solar Energy Absorbed	10%
Glare Reduction	1%
Shading Coefficient	0.96
Solar Heat Gain Coeff. (G-Value)	0.84
U-Value Winter (IP)	1.07
U-Value Winter (SI)	6.07
Total Solar Energy Rejected	16%

R12306T PS

SAFETY ACCREDITATIONS

Impact	AS/NZS 2208	✓
	ANSI Z97.1 (12" pendulum fall)	✓
	ANSI Z97.1 (18" pendulum fall)	✓
	CPSC 1201 Category 1 (18" pendulum fall)	✓
	CPSC 1201 Title 16 (48" pendulum fall)	✓
	BS 6206 Class B	✓
	EN 12600 Class 2B2	✓
Anti Graffiti	Paris Metro Anti Graffiti	✓
Fire	ASTM D1929 Ignition	✓
	ASTM E84 Surface Burn	✓
Bomb Blast	GSA Level C (4 psi, 30psi/msec)	P (3B)

PRODUCT DATA SHEET

Avery Dennison® Exterior Clear Safety Films

Issued: 10/2021

Introduction
Avery Dennison® SF Clear X window films feature exceptional clarity, low reflectance and high levels of UV protection.

Conversion
For conversion information please review the Technical Bulletin “Avery Dennison® Safety Window Films”.

Recommendations
These exterior safety films provide an additional level of protection from the external side of the window, ensuring that glass shards do not injure passing pedestrians. The transparent films offer excellent clarity, low reflectance and high UV protection, and are available in two different thicknesses.

Features
- Substrate compatibility with glass or mirrors
- Superb optical clarity for no compromise vision
- Forced entry, break-in protection

Face Film
SF Clear 4 mil X; SF Clear 7 mil X translucent PET with exterior durable SR hard coat advanced PS adhesive system

Adhesive
Pressure sensitive Permanent – Solvent based acrylic

Backing
PET

Durability
5 years (vertical) and 3 years (horizontal/sloped)[1)]

Shelf Life
When stored in original packaging upon arrival at the customer: 2 years. Recommended Storage conditions are 20 °C (± 2 °C) with 50 %RH (± 5%).

Certification:

	Norm	SF Clear 4 mil X	SF Clear 7 mil X
Fire Certification	DIN EN 13501-1	B-s1, d0	B-s1, d0
Impact	EN 12600	2B2	1B1

[1)] Warranted Durability

The durability is based on middle European exposure conditions. Actual performance life will depend on substrate preparation, exposure conditions and maintenance of the marking. For instance, in the case of signs facing south; in areas of long high temperature exposure such as southern European countries; in industrially polluted areas or high altitudes, exterior performance will be decreased. With regard to Avery Dennison Architectural Window Film Products, the durability shall not differ between the climatic zones, but the same durability shall apply to all climatic zones

Physical Characteristics

Mechanical Properties:

	SF Clear 4 mil X	SF Clear 7 mil X
Thickness	4 mil	7 mil
Tensile Strength at Break	28,500 PSI	26,000 PSI
Break Strength	112 lb/inch	180 lb/inch
Elongation at Break	125%	140%
Peel Strength	7 lb/inch	7 lb/inch

Optical & Solar Properties:

	SF Clear 4 mil X	SF Clear 7 mil X
	Single Pane	Single Pane
Visible Light Transmitted %	88	88
Visible Light Reflected (Int) %	10	11
Visible Light Reflected (Ext) %	10	11
U V Block %	99	99
Total Solar Energy Reflected %	10	9
Total Solar Energy Transmitted %	80	80
Total Solar Energy Absorbed %	10	11
Shading Coefficient	0,96	0,95
Total Solar Energy Rejected %	17	17
Solar Heat Gain Coefficient	0,83	0,83
U-Value Winter	1,04	1,04
K-Value Winter	5,91	5,91
Glare Reduction %	2	2

Important

Information on physical and chemical characteristics and values in this document are based upon tests we believe to be reliable and do not constitute a warranty. They are intended only as a source of information and are given without guarantee and do not constitute a warranty. Purchasers should independently determine, prior to use, the suitability of this material to their specific use.

All technical data are subject to change. In case of any ambiguities or differences between the English and foreign versions of this document, the English version shall be prevailing and leading.

SAFETYSHIELD®
BY MADICO

SafetyShield 800 Optivision 15

SafetyShield 800 Optivision 15 adds an additional layer of protection by controlling the view from the exterior. The film is reflective from the outside and also contains a special layer on the interior side to reduce reflections when looking out.

Product Benefits

- Invisible Protection
- 4-Ply Construction
- Controls View From Outside
- Holds Broken Glass Together
- Cuts Glare
- Lowers Interior Reflectivity
- Reduces Energy Costs
- Rejects over 99% of UV Rays
- Reduces Fading of Fabrics, Flooring

Why SafetyShield?

SafetyShield films and attachment systems help protect against intrusion and provide blast mitigation in a variety of situations. Safetyshield products are tested under extreme conditions and are engineered to meet your high performance security needs. With over 100 years of innovation, Madico is a leading provider of professionally installed, quality products.

About Madico

Headquartered in Tampa Bay, Florida, Madico, Inc. innovates, manufactures, and distributes a broad range of protective, functional and decorative materials-based solutions including films, coatings and laminates for various industries worldwide from automotive and architecture to healthcare and aerospace. Since 1903, Madico has pioneered industry-first products with an unrivaled commitment to quality and dedication to its customers. Madico is a fully-owned subsidiary of Lintec USA Holdings, Inc. For more information, visit www.madico.com.

IWFA INTERNATIONAL WINDOW FILM ASSOCIATION®

AIMCAL ASSOCIATION OF INDUSTRIAL METALLIZERS, COATERS AND LAMINATORS®

NFRC® MEMBER

RECOMMENDED SKIN CANCER FOUNDATION

SafetyShield 800 Opti. 15
CSI Specification

U.S. 888.887.2022 • Intl. +1 727.327.2544
contact@madico.com • madico.com

MADICO®
The Clear Choice for Safety Glazing Systems

MADICO®

SAFETY & SECURITY SERIES

SafetyShield 800 Optivision 15

Performance Measurements

Visible Light:

Transmitted	14%
Reflected Exterior	47%
Reflected Interior	20%
Glare Reduction	85%

Total Solar Energy:

Transmitted	13%
Reflected	39%
Absorbed	47%
Shading Coefficient	0.31
Solar Heat Gain Coefficient	0.27
U Factor	0.93
Ultraviolet Rejection	Exceeds 99%
Emissivity	0.68
Light to Solar Gain	0.51
Total Solar Energy Rejection	73%
Infrared Rejection*	91%
Infrared Energy Rejection	73%

Physical Properties:

Film Thickness	0.011"
Structural Component	0.0095"
Structure	Multi-Ply Laminate
Adhesive Type	Acrylic Pressure Sensitive
Long. Tensile Strength	28,000 PSI
Traverse Tensile Strength	36,000 PSI
Break Strength	240 Pounds Per Inch (Width)
Long. Elongation at Break	150%
Traverse Elongation at Break	100%
Yield Strength	14,000 PSI Avg. MD/TD
Elongation at Yield	120%
Peel Strength	5 to 6 Pounds Per Inch (Width)

* Near IR range (780-2500nm)
Performance measurement definitions can be found at www.madico.com

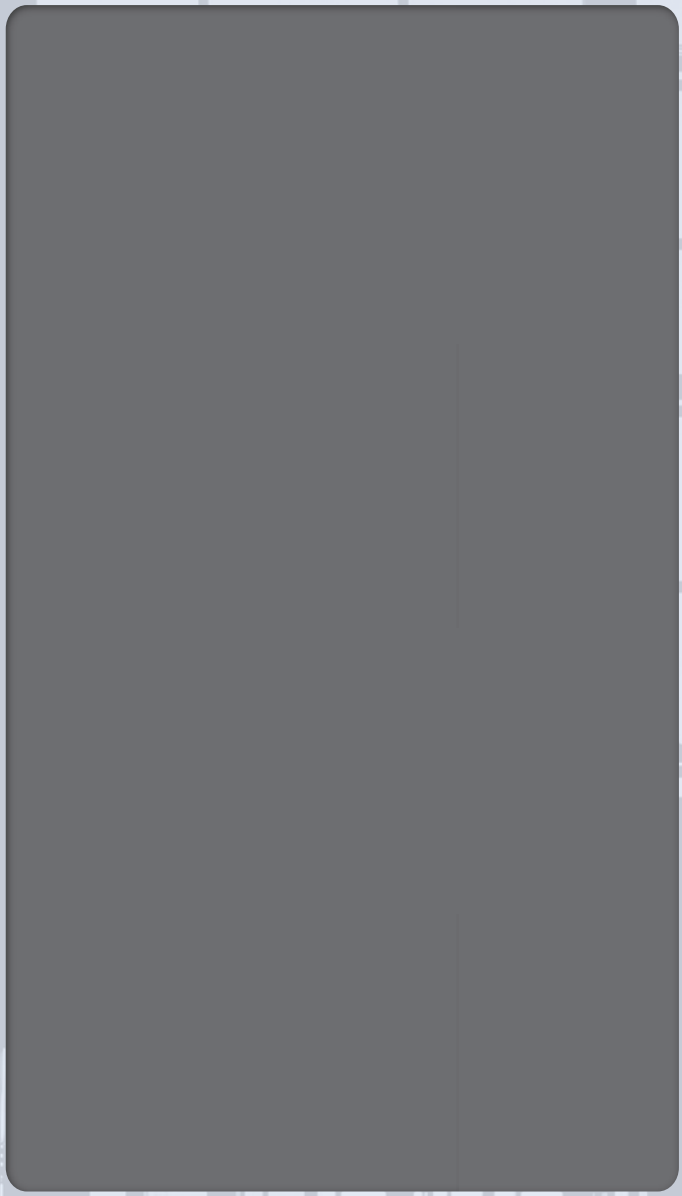
Read in accordance with National Fenestration Rating Council (NFRC) standards on 6mm clear glass.

Independent test reports available upon request

NFRC Certification Pending

SAFETYSHIELD®
BY MADICO

SafetyShield 800 Optivision 25



SafetyShield 800 Optivision 25 adds an additional layer of protection by controlling the view from the exterior. The film is reflective from the outside and also contains a special layer on the interior side to reduce reflections when looking out.

Product Benefits

- Invisible Protection
- 4-Ply Construction
- Controls View From Outside
- Holds Broken Glass Together
- Cuts Glare
- Lowers Interior Reflectivity
- Reduces Energy Costs
- Rejects over 99% of UV Rays
- Reduces Fading of Fabrics, Flooring

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RECOMMENDED SKIN CANCER FOUNDATION

SafetyShield 800 Opti. 25
CSI Specification

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SAFETY & SECURITY SERIES

SafetyShield 800 Optivision 25

Performance Measurements

Visible Light:

Transmitted	24%
Reflected Exterior	30%
Reflected Interior	15%
Glare Reduction	74%

Total Solar Energy:

Transmitted	23%
Reflected	27%
Absorbed	51%
Shading Coefficient	0.43
Solar Heat Gain Coefficient	0.38
U Factor	0.96
Ultraviolet Rejection	Exceeds 99%
Emissivity	0.73
Light to Solar Gain	0.63
Total Solar Energy Rejection	63%
Infrared Rejection*	84%
Infrared Energy Rejection	63%

Physical Properties:

Film Thickness	0.011"
Structural Component	0.0095"
Structure	Multi-Ply Laminate
Adhesive Type	Acrylic Pressure Sensitive
Long. Tensile Strength	28,000 PSI
Traverse Tensile Strength	36,000 PSI
Break Strength	240 Pounds Per Inch (Width)
Long. Elongation at Break	150%
Traverse Elongation at Break	100%
Yield Strength	14,000 PSI Avg. MD/TD
Elongation at Yield	120%
Peel Strength	5 to 6 Pounds Per Inch (Width)

* Near IR range (780-2500nm)
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Read in accordance with National Fenestration Rating Council (NFRC) standards on 6mm clear glass.

Independent test reports available upon request

NFRC Certification Pending