Specifications for 3M™ Scotchshield™ Security Window Film S2400

1.0 Scope

This specification is for an optically clear, polyurethane-based window film which, when applied to the interior glass window or glass door surface, will help hold broken glass together and reduce the ultraviolet light that normally would enter through the glass. This easily applied, tear-resistant security window film is engineered for the following applications:

- Helps prevent flying glass shards in the following applications:
  - ✓ Spontaneous Glass Breakage
  - ✓ Break and Entry Incidents
  - ✓ Seismic Events
  - ✓ Intentional and Accidental Explosions (intended only for applications to commercial and non-educational government facilities)
  - ✓ Wind-borne debris impact protection
- Helps delay intruders in break and entry incidents
- Helps protect against ultraviolet (UV) fading
- Helps meet many industry performance standards for glass fragment retention

Product must be installed with the 3M™ Impact Protection Attachment (IPA) Sealant for all windstorm, break & entry, and explosion mitigation applications and for all spontaneous glass breakage applications on single pane tempered glass. The product is not bulletproof and is not designed to stop intruders.

Product must be installed strictly in accordance with these specifications and 3M instruction guidelines.

Important Handling and Installation Instructions: This is a thick but flexible film which has both an adhesive liner and a protective top sheet. Precut sheets should be handled carefully and shipped flat to avoid pop-off of the liner which may result in a visible defect after installation. The protective top sheet can be left on as an aid to installation, but must be removed prior to application of 3M™ Impact Protection Attachment (IPA) Sealant.

2.0 Applicable Documents

The publications listed below form a part of this specification to the extent referenced.

The 1985 American Society for Heating, Refrigeration, and Air Conditioning Engineers (ASHRAE) Handbook of Fundamentals.

The American National Standards Institute (ANSI):
ANSI Z97.1 – 2015 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 European Standards (EN):
- EN 13501-1 Standard for fire classification of construction products and building elements - Part 1: Classification using data from reaction to fire tests
- EN 12600 Standard for glass in building - Pendulum test - Impact test method and classification for flat glass
- EN 356 Standard for glass in building - Security glazing - Testing and classification of resistance against manual attack

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

Berkeley Lab 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 consists of an optically clear polyurethane film with a durable acrylic abrasion-resistant coating over one surface, and a UV-stabilized pressure-sensitive adhesive on the other. The film's color is clear. The film has a nominal thickness of 610 µm (24 mils). There are no observed adhesive coating voids.

3.2 **Film Properties (typical):**

a) Tensile Strength (ASTM D882): Coated Film: 22 MPa (3200 psi) [MD] / 22 MPa (3200 psi) [TD]
b) Break Strength (ASTM D882): Coated Film: 13.5 N/mm (77 lbs/in) [MD] / 13.5 N/mm (77 lbs/in) [TD]
c) Percent Elongation at Break (ASTM D882): Coated Film: 560 % [MD] / 560% [TD]
d) Graves Tear Resistance (ASTM D1004):
Maximum Force: Coated Film: 57.8 N (13 lbs) [MD] / 57.8 N (13 lbs) [TD]
Maximum Extension: Coated Film: 82.55 mm (3.25 in) [MD] / 82.55 mm (3.25 in) [TD]
Graves Area Tear Resistance: Coated Film: 2779 N-mm (24.6 lbf-in) [MD] / 2779 N-mm (24.6 lbf-in) [TD]

3.3 **Solar Performance Properties:** film applied to 6 mm thick clear glass.

a) Visible Light Transmission (ASTM E 903): 89%
b) Visible Reflection (ASTM E 903): not more than 10%
c) Ultraviolet Transmission (ASTM E 903): less than 1% (300 - 380 nm)
d) Solar Heat Gain Coefficient (ASTM E 903): 0.80

3.4 **Flammability:** Upon request from a 3M Authorized Window Film Dealer, 3M will provide independent test data showing that the window film meets the requirements of a B-s1, d0 classification per EN 13501-1 and of a Class A Interior Finish for Building Materials for both Flame Spread Index and Smoked Development Values per ASTM E-84.

3.5 **Adhesion to Glass:** Upon request from a 3M Authorized Window Film Dealer, 3M will provide test data showing that the film has a 180-degree peel strength (adhesion to glass) according to ASTM D-1044 of 0.6 N/mm (3.2 lbs/in) ((typical).

3.6 **Adhesive System:** The film is supplied with a high mass pressure sensitive weatherable acrylate adhesive applied uniformly over the surface opposite the abrasion-resistant coated surface. The adhesive is pressure sensitive (not water activated) and physically bonded (not chemically bonded) to the glass. The adhesive is essentially optically flat and will meet the following criteria:

a) Viewing the film from a distance of 3 meters at angles up to 45 degrees perpendicular from either side of the glass, the film itself will not appear distorted.
b) It is not 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:** Upon request from a 3M Authorized Window Film Dealer, 3M will provide independent test data showing that the film, when applied to either side of the window glass in accordance with 3M instructions, meets the 1B1 impact requirements of EN 12600 for 4 mm and 6 mm annealed glass and the 400 ft-lb impact requirements of ANSI Z97.1 (Class A, Unlimited) for both 1/8" and 1/4" annealed glass..

3.8 **Blast Mitigation:** Upon request from a 3M Authorized Window Film Dealer, 3M will provide independent test data showing the following:

a) GSA Rating of "2" / ASTM F1642 "Minimal Hazard" with target blast pressure of 6 psi and 42 psi-msec blast impulse, on ¼" annealed single pane glass and 3M™ Impact Protection Attachment (IPA) Sealant
b) GSA Rating of "2" / ASTM F1642 "Minimal Hazard" with target blast pressure of 6 psi and 42 psi-msec blast impulse, on ¼" tempered single pane glass with 3M™ Impact Protection Attachment (IPA) Sealant

4.0 Requirements of the Manufacturer

4.1 **Core Labeling**. 3M will clearly identify and label each film core with the product designation and run number.

4.2 **Manufacturer**. Materials shall be manufactured by:
3M Commercial Branding and Transportation
3M Center, Building 280
St. Paul, MN 55144-1000

5.0 Application

5.1 **Examination**: Examine glass surfaces intended to receive new film and verify that they are free from defects and imperfections, which will affect the final appearance and potentially the as-installed performance. Correct all deficiencies before starting film application.

5.2 **Preparation**:

a) A clean and dust-free work area should be provided when the films are installed, paying attention to ventilation systems which may deposit contamination from other work areas.
b) The window and window framing must be cleaned thoroughly with a neutral cleaning solution. The inside surface of the window glass may need to be scraped with stainless steel razor blades with clean, sharp edges to ensure the removal of any foreign contaminants without damaging the glass surface.
c) Drop cloths or other absorbent material are to be placed on the windowsill or sash to absorb moisture accumulation generated by the film application.

5.3 **Installation**: The film shall be applied as to the specifications and instructions of 3M by a 3M Authorized Window Film Dealer.

a) Materials will be delivered to the job site with the manufacturer's labels intact and legible.
b) To minimize waste, the film may 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 3 mm (1/8") to 1.6 mm (1/16") of the window-sealing device.
c) Film is wet-applied using clean water and slip solution to facilitate positioning of the film onto glass.
d) To help ensure efficient removal of excess water from the underside of the film and to maximize bonding of the pressure sensitive adhesive, plastic bladed squeegees are to be used.
e) S2400 has a thin protective film layer on top that must be removed before application of 3M™ Impact Protection Attachment (IPA) Sealant. The protective film layer can be removed before or after installation of the film as needed.
f) After installation, any leftover 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.

6.0 Guidelines for 3M Window Film Inspections, Cleaning and Maintenance

Please refer to Instruction Bulletin "Cleaning and Maintenance of 3M Window Films" for important information on how to inspect, clean and maintain the installed window film application. IMPORTANT: Do NOT wash windows for the first thirty (30) days after installation.

7.0 Health & Safety

⚠ WARNING
To help reduce the risk of personal injury and/or property damage associated with glass breakage, when working on or near glass surfaces, always use appropriate personal protective equipment.

Tools and Equipment Usage
When using any equipment, always follow the manufacturer's instructions for safe operation.

Chemicals
When handling any chemical products, read the manufacturers' container labels and the Safety Data Sheets (SDS) for important health, safety, and environmental information.

Follow this link to obtain SDS sheets for 3M products.

Follow this link to obtain information about substances of very high concern (SVHC) for EU products.

8.0 Important Product Notices

⚠ CAUTION
While 3M™ Window Films, when applied in accordance with 3M instructions, may help reduce the impact of flying glass shards under certain conditions and potentially delay intruders, THESE FILMS DO NOT PREVENT PROPERTY DAMAGE, PERSONAL INJURY, OR DEATH. WINDOW FILMS ARE NOT BULLETPROOF AND NOT DESIGNED TO STOP INTRUDERS.

⚠ CAUTION
Although certain 3M™ Window Films help block a certain percentage of UVA and UVB radiation and may have received The Skin Cancer Foundation Seal of Recommendation, the efficacy of these films in protecting against skin cancer has not been tested by 3M and 3M™ WINDOW FILMS DO NOT PREVENT SKIN CANCER.

Important Product and Application Limitations
Many factors can contribute to potential hazards and damages arising from wind, impact, seismic, explosion, or break and entry incidents, including the window film selected, type and thickness of glass, building construction, exterior pressure, proximity of impact occurrence, quality of window or door frames, intruder size and strength, and type of tools used to gain entry. Certain 3M™ Window Films require the use of 3M™ Impact Protection Attachment (IPA) Sealant on glass window and door frames for windstorm, break and entry, and explosion mitigation applications and for spontaneous glass breakage applications on single pane tempered glass. The sealant may also be recommended for certain other spontaneous glass breakage, safety glazing, and seismic applications. Always refer to the 3M Technical Data Sheets and 3M Technical Specifications to determine whether these combinations are required. Always consult with security professionals and a 3M Authorized Window Film Dealer prior to selecting any window films to determine suitability for the intended application.

9.0 Warranty Information

Technical Information
Technical information, guidance, and other statements provided by 3M are based upon records, tests, or experience that 3M believes to be reliable, but the accuracy, completeness, and representative nature of such information is not guaranteed. Such information is intended for people with knowledge and technical skills sufficient to assess and apply their own informed judgment to the information. No license to any intellectual property rights is granted or implied with respect to this technical information.

Product Selection and 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. Customer is solely responsible for evaluating the product and determining whether it is appropriate and suitable for customer's application, including conducting a workplace hazard assessment, reviewing all applicable regulations and standards, and reviewing the product label and use instructions. Failure to properly evaluate, select, and use a 3M product in accordance with instructions or to meet all applicable safety regulations may result in injury, sickness, death, and/or harm to property.

Warranty, Limited Remedy, and Disclaimer
Unless a different warranty is specifically stated on the applicable 3M product packaging or product literature (in which case such warranty governs), 3M warrants that each 3M product meets the applicable 3M product specification at the time 3M ships the product. Please refer to the Warranty Bulletin for 3M™ Window Films (Flat Glass Applications) and 3M™ Impact Protection Attachment (IPA) Sealant for complete details on warranty coverage, which can be obtained by contacting your 3M Authorized Window Film Dealer or your local 3M sales representative. 3M MAKES NO OTHER WARRANTIES OR CONDITIONS, EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, ANY WARRANTY OR CONDITION OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, OR ARISING OUT OF A COURSE OF DEALING, CUSTOM, OR USAGE OF TRADE. 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.

Limitation of Liability
Except for the limited remedy stated above, and except to the extent prohibited by law, 3M will not be liable for any loss or damage arising from or related to the 3M product, whether direct, indirect, special, incidental, or consequential (including, but not limited to, lost profits or business opportunity), regardless of the legal or equitable theory asserted, including, but not limited to, warranty, contract, negligence, or strict liability.
All questions of warranty and liability relating to this product are governed by the terms and conditions of the sale, subject, where applicable, to the prevailing law. 3M Commercial Branding and Transportation products are not tested against automotive manufacturer specifications!

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