



## SECTION 08873

### SAFETY AND SECURITY WINDOW FILM

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#### PART 1 GENERAL

##### 1.1 SECTION INCLUDES

- A. Safety and security window film.
- B. Anti-graffiti window film.
- C. Film attachment systems.

##### 1.2 RELATED SECTIONS

- A. Section 08500 - Windows: Windows to receive solar control film.
- B. Section 08600 - Skylights: Glass Skylights to receive solar control film.
- C. Section 08800 - Glazing: General Glazing applications to receive solar control film.
- D. Section 08900 - Glazed Curtain Walls: Curtain Walls to receive solar control film.

##### 1.3 REFERENCES

- A. ASTM International (ASTM):
  - 1. ASTM D 412 - Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers – Tension.
  - 2. ASTM D 2240 – Standard Test Method for Rubber Property – Durometer Hardness.
  - 3. ASTM D 624 - Standard Test Method of Test for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomers.
  - 4. ASTM D 5895 - Standard Test Methods for Evaluating Drying or Curing During Film Formation of Organic Coatings Using Mechanical Recorders.
  - 5. ASTM E 84 - Standard Method of Test for Surface Burning Characteristics of Building Materials.
  - 6. 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.
  - 7. ASTM E 1996 - Standard Specification for Performance of Exterior Windows, Curtain Walls, Doors and Impact Protective Systems Impacted by Windborne Debris in Hurricanes.
  - 8. ASTM E 330 – Standard Test Method for Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure
  - 9. ASTM F 1642 Standard Test Method for Glazing and Glazing Systems Subject to Airblast Loadings

10. ASTM G 26 - Standard Practice for Performing Accelerated Outdoor Weatherizing for Non-metallic Materials Using Concentrated Natural Sunlight.
- B. GSA-TS01-2003 -- Standard Test for Glazing and Glazing Systems Subject to Airblast Loadings.
- C. ISO 16933, International Standard for Glass in Building: Explosion-resistant security glazing - Test and classification for arena air-blast testing.

#### 1.4 PERFORMANCE REQUIREMENTS

- A. Flammability: Surface burning characteristics when tested in accordance ASTM E 84:
  1. Flame Spread Index: 25, maximum.
  2. Smoke Developed Index: 450, maximum.

#### 1.5 SUBMITTALS

- A. Submit under provisions of Section 01300.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
  1. Installation instructions and recommendations.
  2. Storage and handling requirements and recommendations.
- C. Performance Submittals: Provide 3<sup>rd</sup> party test reports or other documentation for relevant safety and security glazing performance testing

#### 1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications: All primary products specified in this section will be supplied by a single manufacturer with a minimum of ten years experience.
- B. Installer Qualifications: All products listed in this section are to be installed by a single installer with a minimum of five years demonstrated experience in installing products of the same type and scope as specified.
  1. Provide documentation that the installer is authorized by the Manufacturer to perform Work specified in this section.
  2. Provide a commercial building reference list of 5 properties where the installer has applied Impact Protection Attachment systems. This list will include the following information:
    - a. Name of building.
    - b. The name and telephone number of a management contact.
    - c. Type of film attachment system.
    - d. Amount of film attachment system installed (lineal feet).
    - e. Date of completion.
- C. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.
  1. Finish areas designated by Architect.
  2. Do not proceed with remaining work until workmanship is approved by Architect.
  3. Refinish mock-up area as required to produce acceptable work.

#### 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging at room temperature until ready for installation.

- B. Store and dispose of hazardous materials, and materials contaminated by hazardous materials, in accordance with requirements of local authorities having jurisdiction.

## 1.8 PROJECT CONDITIONS

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

## 1.9 WARRANTY

- A. At project closeout, provide to Owner or Owners Representative an executed current copy of the manufacturer's standard limited warranty outlining its terms, conditions, and exclusions from coverage.

## PART 2 PRODUCTS

### 2.1 MANUFACTURERS

- A. Acceptable Manufacturer: 3M Window Film , which is located at: 3M Center Bldg. 0235-02-S-27 ; St. Paul, MN 55144-1000; Toll Free Tel: 888-364-3577; Web: [www.3m.com/windowfilm](http://www.3m.com/windowfilm)
- B. Substitutions: not permitted.
- C. Requests for substitutions will be considered in accordance with provisions of Section 01600.

### 2.2 3M Impact Protection Adhesive

- A. 3M Impact Protection Adhesive. Structural "wet glaze" film attachment system. Weatherable UV resistant polymer, moisture curable. Low VOC content and low odor.
  - 1. Properties, as supplied
    - a. Color (select one)
      - 1) Black
      - 2) White
    - b. Typical Cure Time: 3 – 7 days (25°C, 50% RH)
    - c. Full Adhesion: 7 – 14 days
    - d. Tack-Free Time (ASTM D 5895): 21 minutes (25°C, 50% RH)
    - e. Flow, Sag or Slump (ASTM D 2202): 0 inches
    - f. Specific Gravity: 1.4
    - g. Working Time: 10 – 20 minutes (25°C, 50% RH)
    - h. VOC Content: 16 g/L
  - 2. Properties, as cured (21 days at 25°C, 50% RH)
    - a. Ultimate Tensile Strength (ASTM D412): 380 psi (2.62 MPa)
    - b. Ultimate Elongation (ASTM D412): 640 psi
    - c. Durometer Hardness, Shore A (ASTM D2240): 38-39 points
    - d. Tear Strength, Die B (ASTM D624): 72 ppi
  - 3. Uniformity: Product shall have uniform consistency and appearance, with no clumping.
  - 4. Identification: Labeled as to Manufacturer as listed in this Section.
  - 5. Windstorm Protection:
    - a. As part of a filmed glass system, film attachment shall demonstrate ability to withstand Medium Large Missile C and Small Missile A impact, with subsequent pressure cycling (per ASTMs E 1996 and E 1886) at +/- 70

- psf design pressure.
  - b. As part of a filmed glass system, film attachment shall demonstrate ability withstand structural load requirements of ASTM E330 when tested at +/- 120 psf design pressure.
- 6. Bomb Blast Mitigation: Independent testing with results from high explosive arena blast testing.
  - a. GSA Rating with minimum blast pressure and impulse of 4 psi and 28 psi.msec, respectively: "2" (No Hazard / Very High Protection).
  - b. GSA Rating with minimum blast pressure and impulse of 11 psi and 55 psi.msec, respectively: "2" (No Hazard / Very High Protection).
  - c. GSA Rating with minimum blast pressure and impulse of 10 psi and 89 psi.msec, respectively: "3B" (Low Hazard / High Protection).
  - d. ASTM F 1642 Rating with nominal blast pressure and impulse of 8 psi and 42 psi.msec, respectively: "Low Hazard"

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. If application of window film is (was) the responsibility of another installer, notify Architect in writing of deviations from manufacturer's recommended installation tolerances and conditions.
  - 1. Filmed glass surfaces receiving new attachment should first be examined to verify that they are free from defects and imperfections, and that the film edges extend sufficiently to the frame edges.
- B. Do not proceed with installation until film and frame surfaces have been properly prepared and deviations from manufacturer's recommended tolerances are corrected. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result under the project conditions.
- C. At the request of the specifying authority, an adhesion test to the frame surface may be conducted by applying a 4 - 6 inch long bead, approximately 0.5 – 1 inch in width, masking one side of the frame surface underneath the strip with tape. Allow the Impact Protection Adhesive to cure for 7 days and test adhesion by pulling up on the masked end and a 90 degree angle. If cohesive failure is observed (adhesive residue left behind on the frame surface), adhesion is acceptable; if adhesive failure is observed (clean peel from the frame), adhesion is unacceptable and product is not recommended.
- D. Commencement of installation constitutes acceptance of conditions.

### 3.2 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
- C. Installer shall take necessary precautions to protect interior furnishings.

### 3.3 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Recommended minimum bead overlap for blast mitigation is 0.5 inch on both film and frame surfaces (excluding the glazing stops or compression gaskets); 0.375 inches on both surface for windstorm protection.

- C. To ensure a straight and consistent bead width is achieved, masking tape may be applied to film and frame surfaces before application of 3M Impact Protection Adhesive.
- D. With prior approval of the building owner, property manager, or specifying authority, existing compression gaskets may be partially removed or trimmed to allow for a thinner bead. If removing the gaskets, trim sections approximately 3 inches in length and insert with appropriate spacing along all sides of the window to help secure the glazing during application and curing of the Impact Protection Adhesive.
- E. Dispense Impact Protection Adhesive with a caulk gun and nozzle having an opening cut to approximate size of desired bead width.
- F. Use a plastic putty knife to trowel and smooth out the adhesive. The trowel shall have a straight edge to create a triangular shaped bead with a smooth, flat surface.
- G. Carefully remove any masking tape within 10 minutes of application before the Impact Protection Adhesive begins to form a hard skin.

#### 3.4 CLEANING AND PROTECTION

- A. Product shall be allowed to cure for at least 3 to 7 days. Use necessary means to protect after installation.
- B. Touch-up, repair or replace damaged sections before Substantial Completion.
- C. Remove any uncured excess material on film or frame using a disposable cloth or paper towel wet with isopropyl alcohol.
- D. Common window cleaning solutions may be used 30 days after installation.

END OF SECTION