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. ASHRAE - American Society for Heating, Refrigeration, and Air Conditioning Engineers; Handbook of Fundamentals.

B. ASTM International (ASTM):
1. ASTM D 882 - Standard Test Method for Tensile Properties of Thin Plastic Sheeting.
2. ASTM D 412 - Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers -- Tension.
3. ASTM D 624 - Standard Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomers
4. ASTM D 1004 - Standard Test Method for Tear Resistance (Graves Tear) of Plastic Film and Sheeting.
5. ASTM D 1044 - Standard Method of Test for Resistance of Transparent Plastics to Surface Abrasion (Taber Abrader Test).
6. ASTM D 2240 - Standard Method for Rubber Property – Durometer Hardness.
7. ASTM D 2582 - Standard Test Method for Puncture-Propagation Tear Resistance of Plastic Film and Thin Sheeting.

8. ASTM D 5895 - Standard Test Methods for Evaluating Drying or Curing During Film Formation of Organic Coatings Using Mechanical Recorders.
9. ASTM D 4830 - Standard Test Methods for Characterizing Thermoplastic Fabrics Used in Roofing and Waterproofing.
10. ASTM E 84 - Standard Method of Test for Surface Burning Characteristics of Building Materials.
11. ASTM E 903 - Standard Methods of Test for Solar Absorbance, Reflectance and Transmittance of Materials Using Integrating Spheres.
12. 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.
13. ASTM E 1996 - Standard Specification for Performance of Exterior Windows, Curtain Walls, Doors and Impact Protective Systems Impacted by Windborne Debris in Hurricanes.
14. ASTM F1642 – Standard Method of Test for Glazing and Glazing Systems Subject to Airblast Loadings
15. ASTM F2912 – Standard Specification for Glazing and Glazing Systems Subject to Airblast Loadings

C. ANSI Z97.1 - American National Standard for Safety Glazing Materials Used in Buildings - Safety Performance Specifications and Methods of Test.

D. Consumer Products Safety Commission 16 CFR, Part 1201 - Safety Standard for Architectural Glazing Materials.

E. GSA-TS01-2003 -- Standard Test for Glazing and Glazing Systems Subject to Airblast Loadings.

F. ISO 16933, International Standard for Glass in Building: Explosion-resistant security glazing - Test and classification for arena air-blast testing.

G. Underwriters Laboratories Inc. (UL): UL 972 - Burglary Resisting Glazing Material.

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.

B. Abrasion Resistance: Film must have a surface coating that is resistant to abrasion such that, less than 5 percent increase of transmitted light haze will result in accordance with ASTM D 1044 using 50 cycles, 500 grams weight, and the CS10F Calbrase Wheel.

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. Preparation instructions and recommendations.
2. Storage and handling requirements and recommendations.
3. Installation methods.

C. Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.

D. Verification Samples: For each finish product specified, two samples representing

actual product, color, and patterns.

E. Performance Submittals: Provide laboratory data of emissivity and calculated window U-Factors for various outdoor temperatures based upon established calculation procedure defined by the ASHRAE Handbook of Fundamentals, Chapter 29, or Lawrence Berkeley Laboratory Window 5.2 Computer Program.

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 window film. This list will include the following information:
      a. Name of building.
      b. The name and telephone number of a management contact.
      c. Type of glass.
      d. Type of film.
      e. Amount of film installed.
      f. Date of completion.
   3. Provide a Glass Stress Analysis of the existing glass and proposed glass/film combination as recommended by the film Manufacturer.
   4. Provide an application analysis to determine available energy cost reduction and savings.

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, color, and sheen are 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 until ready for installation.

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 recommended limits.

1.9 WARRANTY

A. At project closeout, provide to Owner’s Representative an executed current copy of the manufacturer's standard limited warranty against manufacturing defect, 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: 800-480-1704; Tel: 651-733-2222; Email: request info (jemannix@mmm.com); Web: 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 FILM ATTACHMENT SYSTEMS

A. **3M Impact Protection Profile (IPP).** Weatherable, flexible-mechanical style film attachment made of extruded rubber profile with two strips of double coated foam tape: one strip for bonding to applied film and the other strip for bonding to the window frame.
   1. 3M Impact Protection Profile, BP-700.
      a. Total width: 1.0 inches.
      b. Tape width: 0.5 inches.
   2. 3M Impact Protection Profile, BP-950.
      a. Total width: 1.3 inches.
      b. Tape width: 0.625 inches.
   3. Material Properties:
      a. Full Adhesion: 1 - 2 days (25°C, 50% RH)
      b. Ultimate Tensile Strength (ASTM D412): > 20,500 psi
      c. Ultimate Elongation (ASTM D412): 400%
      d. Break Strength, Die B (ASTM D624): > 71 ppi
      e. Durometer Hardness, Shore A: (ASTM D2240): 70 pts
   4. Uniformity: Product shall have uniform consistency and appearance.
   5. Flammability: Class A Interior Finish for Buildings.
   6. Windborne Debris Protection:
      a. As part of a filmed glass system, film attachment shall demonstrate ability to withstand Small Missile A impact, with subsequent pressure cycling (per ASTMs E 1996 and E 1886) at +/- 50 psf design pressure.
   7. Bomb Blast Mitigation:
      a. GSA level “2” rating (No Hazard / Very High Protection) with minimum blast load of 4 psi overpressure and 28 psi*msec blast impulse.
      b. GSA level “3B” rating (Low hazard / High Protection) with minimum blast load of 10 psi overpressure and 89 psi*msec blast impulse.
      c. ASTM F1642 rating of “Low Hazard” with minimum blast load of 4 psi overpressure and 28 psi*msec blast impulse.

PART 3 EXECUTION

3.1 EXAMINATION

A. Film Examination:
   1. If preparation of glass surfaces is the responsibility of another installer, notify Architect in writing of deviations from manufacturer's recommended installation tolerances and conditions.
      a. Glass surfaces receiving new film should first be examined to verify that they are free from defects and imperfections, which will affect the final appearance.
   2. Do not proceed with installation until glass 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.
   3. Commencement of installation constitutes acceptance of conditions.

B. Impact Protection Profile Examination:
   1. If application of window film is/was the responsibility of another installer, notification in writing shall be made of deviations from manufacturer's recommended installation tolerances and conditions.
   2. Windows and frames must be examined to ensure that they are fit to receive the Impact Protection Profile in a manner such that the two profile adhesive strips will be perpendicularly opposed to each other and that they will not contact glazing stops or frame gaskets without stretching the profile.
   3. 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.
   4. 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.
   5. Upon the customer's request, an adhesion test to the frame surface may be conducted by applying a 4 - 6 inch long strip on the frame surface, using the sufficient pressure to achieve good adhesive wet-out. Allow the Impact Protection Profile to cure for 1-2 days and test adhesion by removing the test strip. 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 either not recommended, or an adhesion promoter, such as 3M Primer 94, must be used.

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. Refer to Manufacturer's installation instructions for methods of preparation for Impact Protection Adhesive or Impact Protection Profile film attachment systems.

3.3 INSTALLATION

A. Film Installation:
   1. Install in accordance with manufacturer's instructions.
   2. Cut film edges neatly and square at a uniform distance of 1/8 inch (3 mm) to 1/16 inch (1.5 mm) of window sealant. Use new blade tips after 3 to 4 cuts.
   3. Spray the slip solution, composed of one capful of baby shampoo or dishwashing liquid to 1 gallon of water, on window glass and adhesive to facilitate proper positioning of film.
   4. Apply film to glass and lightly spray film with slip solution.
   5. Squeegee from top to bottom of window. Spray slip solution to film and squeegee a second time.
   6. Bump film edge with lint-free towel wrapped around edge of a 5-way tool.
   7. Upon completion of film application, allow 30 days for moisture from film installation to dry thoroughly, and to allow film to dry flat with no moisture dimples when viewed under normal viewing conditions.

B. Impact Protection Profile Installation:
   1. The film attachment system shall be applied according to the specifications of the Manufacturer by an Authorized Dealer/Applicator trained to install 3M Impact Protection Profile. Refer to 3M publication, 70-0709-0323-5, 3M Impact Protection Profile Attachment System Installation Instructions.

2. Each profile piece must span continuously to both sides of the window, within 1/8 inch to the frame edge. Splicing the profile between frame edges is prohibited.
3. Profile must be aligned and applied by 3M recommended or approved methods and tools to ensure a quality installation.
4. Corner joints must be fabricated by 3M recommended and approved methods. No part of the profile adhesive shall make contact with an adjacent profile.
5. Sufficient pressure must be evenly applied along the entire length of the profile to ensure full adhesion from both adhesive strips. A roller tool is required to minimize entrapment of air in the adhesive.

3.4 CLEANING AND PROTECTION

A. Remove left over material and debris from Work area. Use necessary means to protect film before, during, and after installation.

B. Touch-up, repair or replace damaged products before Substantial Completion.

C. After application of film, wash film using common window cleaning solutions, including ammonia solutions, 30 days after application. Do not use abrasive type cleaning agents and bristle brushes to avoid scratching film. Use synthetic sponges or soft cloths.

END OF SECTION