



SECTION 08 87 13
WINDOW FILM

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PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Safety and Security Window Film:
 - 1. Impact protection film attachment systems. (IPA) (IPP)

1.2 RELATED SECTIONS

- A. Section 08 54 13 - Fiberglass Windows.
- B. Section 08 60 00 - Roof Windows and Skylights.
- C. Section 08 83 13 - Mirrored Glass Glazing.
- D. Section 08 44 23 - Structural Sealant Glazed Curtain Wall.

1.3 REFERENCES

- A. ASTM International (ASTM):
 - 1. ASTM D 412 - Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers -- Tension.
 - 2. ASTM D 5895 - Standard Test Methods for Evaluating Drying or Curing During Film Formation of Organic Coatings Using Mechanical Recorders.
 - 3. 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.
 - 4. ASTM E 1996 - Standard Specification for Performance of Exterior Windows, Curtain Walls, Doors and Impact Protective Systems Impacted by Windborne Debris in Hurricanes.
 - 5. ASTM F 1642 - Standard Method of Test for Glazing and Glazing Systems Subject to Airblast Loadings
 - 6. ASTM F 2912 - Standard Specification for Glazing and Glazing Systems Subject to Airblast Loadings.
- B. GSA-TS01 - 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 SUBMITTALS

- A. Submit under provisions of Section 01 30 00 - Administrative Requirements.

- B. Product Data: Manufacturer's current technical literature on each product to be used, including:
 - 1. Manufacturer's Data Sheets.
 - 2. Preparation instructions and recommendations.
 - 3. Storage and handling requirements and recommendations.
 - 4. Installation methods.
- C. Verification Samples: For each film specified, two samples representing actual film color and pattern.

1.5 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.
 - 1. Provide documentation that the adhesive used on the specified films is a Pressure Sensitive Adhesive (PSA).
- 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 and/or film attachment system.
 - e. Amount of film and/or film attachment system installed.
 - f. 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, color, and sheen are approved by Architect.
 - 3. Refinish mock-up area as required to produce acceptable work.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Follow Manufacturer's instructions for storage and handling.
- B. Store products in manufacturer's unopened packaging until ready for installation.
- C. Store and dispose of hazardous materials, and materials contaminated by hazardous materials, in accordance with requirements of local authorities having jurisdiction.

1.7 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.

1.8 WARRANTY

- A. At project closeout, provide to Owner or Owners 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: 866-499-8857; Tel: 651-733-2222; Fax: 651-737-3446; Email:[request info \(jemannix@mmm.com\)](mailto:request info (jemannix@mmm.com)); Web:www.3m.com/windowfilm
- B. Substitutions: Not permitted.

2.2 3M IMPACT PROTECTION FILM ATTACHMENT SYSTEMS

- A. 3M Impact Protection Adhesive (IPA): Weatherable, UV-resistant, moisture curable structural sealant wet glaze.
 - 1. Color:
 - a. Black.
 - 2. Material Properties (as supplied):
 - a. Typical Cure Time: 3 - 7 days (25 degrees C, 50% RH)
 - b. Full Adhesion: 7 - 14 days
 - c. Tack-Free Time (ASTM D 5895): 21 minutes (25 degrees C, 50% RH)
 - d. Flow, Sag or Slump (ASTM D 2202): 0 inches
 - e. Specific Gravity: 1.4
 - f. Working Time: 10 - 20 minutes (25 degrees C, 50% RH)
 - g. VOC Content: 16 g/L
 - 3. Material Properties (as cured - 21 days at 25 degrees 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
 - 4. Uniformity: Product shall have uniform consistency and appearance, with no clumping.
 - 5. Impact Resistance and Pressure Cycling:
 - 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 +/- 75 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 +/- 100 psf design pressure.
 - 6. Blast Hazard Mitigation:
 - a. GSA level "2" rating (minimal hazard) of "2" with minimum blast load of 11 psi overpressure and 55 psi*msec blast impulse.
 - b. GSA level "3B" rating (low hazard) 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 8 psi overpressure and 42 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 Adhesive 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. 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.
3. 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.
4. Upon the customer's request, 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.

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, General:

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.
8. If completing an exterior application, check with the manufacturer as to whether edge sealing is required.

B. Impact Protection Adhesive Installation:

1. The film attachment system shall be applied according to the specifications of the Manufacturer by an Authorized Dealer/Applicator. Refer to 3M publication, 70-0709-

0322-7, 3M Impact Protection Adhesive Attachment System Installation Instructions.

- a. For blast mitigation: minimum 1/2 inch bead overlap on both frame and film (excluding glazing stops or compression gaskets).
 - b. For windborne debris protection: minimum 3/8 inch bead overlap on both frame and film (excluding glazing stops or compression gaskets).
2. To ensure a straight and consistent bead width is achieved, masking tape may be applied to film and frame surfaces prior to application.
 3. With prior approval of the building owner or property manager, existing compression gaskets may be partially removed or trimmed to allow for a thinner bead and stronger anchorage. If removing the gaskets, sections shall be trimmed approximately 3 inches in length and inserted with appropriate spacing along all sides of the window to help secure the glazing during application and curing of the Impact Protection Adhesive.
 4. The Impact Protection Adhesive shall be dispensed with a caulk gun with nozzle opening diameter sized to match the approximate size of the desired bead width.
 5. A plastic putty knife or other tool with a clean straight edge shall be used to trowel and smooth out the adhesive. The completed adhesive bead shall be relatively triangular in shape.
 6. Any masking tape used shall be carefully removed within 10 minutes after applying the wet glaze.

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