



SECTION 08870
WINDOW FILM

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PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Patterned film. (Combination)(Dot Patterned)(Line Patterned)(Single Patterned)

1.2 RELATED SECTIONS

- A. Section 08500 - Windows; windows to receive architectural window film.
- B. Section 08600 - Skylights; glass skylights to receive architectural window film.
- C. Section 08800 - Glazing; general glazing applications to receive architectural window film.
- D. Section 08900 - Glazed Curtain Walls; curtain walls to receive architectural window 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 308 - Standard Recommended Practice for Spectrophotometry and Description of Color in CIE 1931 System.
 12. ASTM E 903 - Standard Methods of Test for Solar Absorbance, Reflectance and Transmittance of Materials Using Integrating Spheres.

13. 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.
 14. ASTM E 1996 - Standard Specification for Performance of Exterior Windows, Curtain Walls, Doors and Impact Protective Systems Impacted by Windborne Debris in Hurricanes.
 15. ASTM F1642 - Standard Method of Test for Glazing and Glazing Systems Subject to Airblast Loadings
 16. ASTM F2912 - Standard Specification for Glazing and Glazing Systems Subject to Airblast Loadings.
 17. NFRC 100/200 (Formerly ASTM E903) - Standard Methods of Test for Solar Absorbance, Reflectance and Transmittance of Materials Using Integrating Spheres.
- C. Window 6.3 - A Computer Tool for Analyzing Window Thermal Performance; Lawrence Berkeley Laboratory.
 - D. ANSI Z97.1 - American National Standard for Safety Glazing Materials Used in Buildings - Safety Performance Specifications and Methods of Test.
 - E. IES LM-83-12: IES Spatial Daylight Autonomy (sDA) and Annual Sunlight Exposure.
 - F. Consumer Products Safety Commission 16 CFR, Part 1201 - Safety Standard for Architectural Glazing Materials.
 - G. GSA-TS01 - Standard Test for Glazing and Glazing Systems Subject to Airblast Loadings.
 - H. ISO 16933, International Standard for Glass in Building: Explosion-resistant security glazing - Test and classification for arena air-blast testing.
 - I. Underwriters Laboratories Inc. (UL): UL 972 - Burglary Resisting Glazing Material.

1.4 PERFORMANCE REQUIREMENTS

- A. Fire Performance: Surface burning characteristics when tested in accordance ASTM E 84:
 1. Flame Spread: 25, maximum.
 2. Smoke Developed: 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. Preparation instructions and recommendations.
 2. Storage and handling requirements and recommendations.
 3. Installation methods.
- C. Verification Samples: For each film specified, two samples representing actual film color and pattern.
- D. 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.

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.
 - 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 EFilm 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.
- 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 recommended limits.

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:3Mrenewableenergy@mmm.com; Web:www.3m.com/windowfilm

2.2 COMBINATION PATTERNED FILM

- A. Fasara - Illumina Decorative / Privacy Glazing Film:
 1. Ultraviolet Rejected (ASTM E 903): Not less than 99 percent.
 2. Visible Light Transmission (ASTM E 903, ASTM E 308): Not more than 49 percent.
 3. Visible Light Rejected (ASTM E 903): Not less than 19 percent.
 4. Solar Heat Reduction: Not less than 14 percent.
 5. Shading Coefficient at 90 Degrees (Normal Incidence) (ASTM E 903): Not less than

0.62.

- B. Fasara - Illumina Glace Decorative / Privacy Glazing Film:
 - 1. Ultraviolet Rejected (ASTM E 903): Not less than 99 percent.
 - 2. Visible Light Transmission (ASTM E 903, ASTM E 308): Not more than 49 percent.
 - 3. Visible Light Rejected (ASTM E 903): Not less than 19 percent.
 - 4. Solar Heat Reduction: Not less than 14 percent.
 - 5. Shading Coefficient at 90 Degrees (Normal Incidence) (ASTM E 903): Not less than 0.62.

- C. Fasara - Illumina Glace Decorative / Privacy Glazing Film:
 - 1. Ultraviolet Rejected (ASTM E 903): Not less than 99 percent.
 - 2. Visible Light Transmission (ASTM E 903, ASTM E 308): Not more than 63 percent.
 - 3. Visible Light Rejected (ASTM E 903): Not less than 13 percent.
 - 4. Solar Heat Reduction: Not less than 11 percent.
 - 5. Shading Coefficient at 90 Degrees (Normal Incidence) (ASTM E 903): Not less than 0.74.

- D. Fasara - Prism Noir Decorative / Privacy Glazing Film:
 - 1. Ultraviolet Rejected (ASTM E 903): Not less than 99 percent.
 - 2. Visible Light Transmission (ASTM E 903, ASTM E 308): Not more than 29 percent.
 - 3. Visible Light Rejected (ASTM E 903): Not less than 7 percent.
 - 4. Solar Heat Reduction: Not less than 6 percent.
 - 5. Shading Coefficient at 90 Degrees (Normal Incidence) (ASTM E 903): Not less than 0.48.

- E. Fasara - Prism Silver Decorative / Privacy Glazing Film:
 - 1. Ultraviolet Rejected (ASTM E 903): Not less than 99 percent.
 - 2. Visible Light Transmission (ASTM E 903, ASTM E 308): Not more than 34 percent.
 - 3. Visible Light Rejected (ASTM E 903): Not less than 49 percent.
 - 4. Solar Heat Reduction: Not less than 40 percent.
 - 5. Shading Coefficient at 90 Degrees (Normal Incidence) (ASTM E 903): Not less than 0.40.

- F. Fasara - Astral Silver Decorative / Privacy Glazing Film:
 - 1. Ultraviolet Rejected (ASTM E 903): Not less than 99 percent.
 - 2. Visible Light Transmission (ASTM E 903, ASTM E 308): Not more than 11 percent.
 - 3. Visible Light Rejected (ASTM E 903): Not less than 63 percent.
 - 4. Solar Heat Reduction: Not less than 51 percent.
 - 5. Shading Coefficient at 90 Degrees (Normal Incidence) (ASTM E 903): Not less than 0.19.

- G. Fasara - Lontano Decorative / Privacy Glazing Film:
 - 1. Ultraviolet Rejected (ASTM E 903): Not less than 99 percent.
 - 2. Visible Light Transmission (ASTM E 903, ASTM E 308): Not more than 58 percent.
 - 3. Visible Light Rejected (ASTM E 903): Not less than 21 percent.
 - 4. Solar Heat Reduction: Not less than 17 percent.
 - 5. Shading Coefficient at 90 Degrees (Normal Incidence) (ASTM E 903): Not less than 0.66.

- H. Fasara - Tsurugi Decorative / Privacy Glazing Film:
 - 1. Ultraviolet Rejected (ASTM E 903): Not less than 99 percent.
 - 2. Visible Light Transmission (ASTM E 903, ASTM E 308): Not more than 58 percent.
 - 3. Visible Light Rejected (ASTM E 903): Not less than 20 percent.
 - 4. Solar Heat Reduction: Not less than 16 percent.
 - 5. Shading Coefficient at 90 Degrees (Normal Incidence) (ASTM E 903): Not less than 0.67.

- I. Fasara - Aerina Decorative / Privacy Glazing Film:
 - 1. Ultraviolet Rejected (ASTM E 903): Not less than 99 percent.
 - 2. Visible Light Transmission (ASTM E 903, ASTM E 308): Not more than 75 percent.
 - 3. Visible Light Rejected (ASTM E 903): Not less than 12 percent.
 - 4. Solar Heat Reduction: Not less than 10 percent.
 - 5. Shading Coefficient at 90 Degrees (Normal Incidence) (ASTM E 903): Not less than 0.86.

2.3 DOT PATTERNED FILM

- A. Fasara - Aura 9 Decorative / Privacy Glazing Film:
 - 1. Ultraviolet Rejected (ASTM E 903): Not less than 99 percent.
 - 2. Visible Light Transmission (ASTM E 903, ASTM E 308): Not more than 83 percent.
 - 3. Visible Light Rejected (ASTM E 903): Not less than 8 percent.
 - 4. Solar Heat Reduction: Not less than 7 percent.
 - 5. Shading Coefficient at 90 Degrees (Normal Incidence) (ASTM E 903): Not less than 0.94.
- B. Fasara - Luna 6 Decorative / Privacy Glazing Film:
 - 1. Ultraviolet Rejected (ASTM E 903): Not less than 99 percent.
 - 2. Visible Light Transmission (ASTM E 903, ASTM E 308): Not more than 44 percent.
 - 3. Visible Light Rejected (ASTM E 903): Not less than 21 percent.
 - 4. Solar Heat Reduction: Not less than 15 percent.
 - 5. Shading Coefficient at 90 Degrees (Normal Incidence) (ASTM E 903): Not less than 0.67.
- C. Fasara - Luna 9 Decorative / Privacy Glazing Film:
 - 1. Ultraviolet Rejected (ASTM E 903): Not less than 99 percent.
 - 2. Visible Light Transmission (ASTM E 903, ASTM E 308): Not more than 39 percent.
 - 3. Visible Light Rejected (ASTM E 903): Not less than 23 percent.
 - 4. Solar Heat Reduction: Not less than 16 percent.
 - 5. Shading Coefficient at 90 Degrees (Normal Incidence) (ASTM E 903): Not less than 0.63.
- D. Fasara - Vista Decorative / Privacy Glazing Film:
 - 1. Ultraviolet Rejected (ASTM E 903): Not less than 99 percent.
 - 2. Visible Light Transmission (ASTM E 903, ASTM E308): Not more than 69 percent.
 - 3. Visible Light Rejected (ASTM E 903): Not less than 16 percent.
 - 4. Solar Heat Reduction: Not less than 13 percent.
 - 5. Shading Coefficient at 90 Degrees (Normal Incidence) (ASTM E 903): Not less than 0.80.
- E. Fasara - Cielo Decorative / Privacy Glazing Film:
 - 1. Ultraviolet Rejected (ASTM E 903): Not less than 99 percent.
 - 2. Visible Light Transmission (ASTM E 903, ASTM E 308): Not more than 48 percent.
 - 3. Visible Light Rejected (ASTM E 903): Not less than 19 percent.
 - 4. Solar Heat Reduction: Not less than 15 percent.
 - 5. Shading Coefficient at 90 Degrees (Normal Incidence) (ASTM E 903): Not less than 0.69.

2.4 LINE PATTERNED FILM

- A. Fasara - Arpa Decorative / Privacy Glazing Film:
 - 1. Ultraviolet Rejected (ASTM E 903): Not less than 99 percent.
 - 2. Visible Light Transmission (ASTM E 903, ASTM E 308): Not more than 46 percent.
 - 3. Visible Light Rejected (ASTM E 903): Not less than 22 percent.
 - 4. Solar Heat Reduction: Not less than 17 percent.

5. Shading Coefficient at 90 Degrees (Normal Incidence) (ASTM E 903): Not less than 0.66.
- B. Fasara - Arpa Black Decorative / Privacy Glazing Film:
1. Ultraviolet Rejected (ASTM E 903): Not less than 99 percent.
 2. Visible Light Transmission (ASTM E 903, ASTM E 308): Not more than 30 percent.
 3. Visible Light Rejected (ASTM E 903): Not less than 7 percent.
 4. Solar Heat Reduction: Not less than 6 percent.
 5. Shading Coefficient at 90 Degrees (Normal Incidence) (ASTM E 903): Not less than 0.59.
- C. Fasara - Seattle Decorative / Privacy Glazing Film:
1. Ultraviolet Rejected (ASTM E 903): Not less than 99 percent.
 2. Visible Light Transmission (ASTM E 903, ASTM E 308): Not more than 73 percent.
 3. Visible Light Rejected (ASTM E 903): Not less than 12 percent.
 4. Solar Heat Reduction: Not less than 9 percent.
 5. Shading Coefficient at 90 Degrees (Normal Incidence) (ASTM E 903): Not less than 0.86.
- D. Fasara - Leise Decorative / Privacy Glazing Film:
1. Ultraviolet Rejected (ASTM E 903): Not less than 99 percent.
 2. Visible Light Transmission (ASTM E 903, ASTM E 308): Not more than 74 percent.
 3. Visible Light Rejected (ASTM E 903): Not less than 8 percent.
 4. Solar Heat Reduction: Not less than 7 percent.
 5. Shading Coefficient at 90 Degrees (Normal Incidence) (ASTM E 903): Not less than 0.94.
- E. Fasara - Fine Decorative / Privacy Glazing Film:
1. Ultraviolet Rejected (ASTM E 903): Not less than 99 percent.
 2. Visible Light Transmission (ASTM E 903, ASTM E 308): Not more than 46 percent.
 3. Visible Light Rejected (ASTM E 903): Not less than 25 percent.
 4. Solar Heat Reduction: Not less than 19 percent.
 5. Shading Coefficient at 90 Degrees (Normal Incidence) (ASTM E 903): Not less than 0.62.
- F. Fasara - Shutie Decorative / Privacy Glazing Film:
1. Ultraviolet Rejected (ASTM E 903): Not less than 99 percent.
 2. Visible Light Transmission (ASTM E 903, ASTM E 308): Not more than 52 percent.
 3. Visible Light Rejected (ASTM E 903): Not less than 21 percent.
 4. Solar Heat Reduction: Not less than 17 percent.
 5. Shading Coefficient at 90 Degrees (Normal Incidence) (ASTM E 903): Not less than 0.69.
- G. Fasara - Shutie Black Decorative / Privacy Glazing Film:
1. Ultraviolet Rejected (ASTM E 903): Not less than 99 percent.
 2. Visible Light Transmission (ASTM E 903, ASTM E 308): Not more than 49 percent.
 3. Visible Light Rejected (ASTM E 903): Not less than 6 percent.
 4. Solar Heat Reduction: Not less than 6 percent.
 5. Shading Coefficient at 90 Degrees (Normal Incidence) (ASTM E 903): Not less than 0.70.
- H. Fasara - Nokto Decorative / Privacy Glazing Film:
1. Ultraviolet Rejected (ASTM E 903): Not less than 99 percent.
 2. Visible Light Transmission (ASTM E 903, ASTM E 308): Not more than 12 percent.
 3. Visible Light Rejected (ASTM E 903): Not less than 7 percent.
 4. Solar Heat Reduction: Not less than 6 percent.
 5. Shading Coefficient at 90 Degrees (Normal Incidence) (ASTM E 903): Not less than

0.30.

- I. Fasara - Lattice Decorative / Privacy Glazing Film:
 - 1. Ultraviolet Rejected (ASTM E 903): Not less than 99 percent.
 - 2. Visible Light Transmission (ASTM E 903, ASTM E 308): Not more than 34 percent.
 - 3. Visible Light Rejected (ASTM E 903): Not less than 26 percent.
 - 4. Solar Heat Reduction: Not less than 19 percent.
 - 5. Shading Coefficient at 90 Degrees (Normal Incidence) (ASTM E 903): Not less than 0.60.

- J. Fasara - Lattice Glace Decorative / Privacy Glazing Film:
 - 1. Ultraviolet Rejected (ASTM E 903): Not less than 99 percent.
 - 2. Visible Light Transmission (ASTM E 903, ASTM E 308): Not more than 57 percent.
 - 3. Visible Light Rejected (ASTM E 903): Not less than 13 percent.
 - 4. Solar Heat Reduction: Not less than 11 percent.
 - 5. Shading Coefficient at 90 Degrees (Normal Incidence) (ASTM E 903): Not less than 0.71.

- K. Fasara - Slat Decorative / Privacy Glazing Film:
 - 1. Ultraviolet Rejected (ASTM E 903): Not less than 99 percent.
 - 2. Visible Light Transmission (ASTM E 903, ASTM E 308): Not more than 34 percent.
 - 3. Visible Light Rejected (ASTM E 903): Not less than 26 percent.
 - 4. Solar Heat Reduction: Not less than 19 percent.
 - 5. Shading Coefficient at 90 Degrees (Normal Incidence) (ASTM E 903): Not less than 0.60.

- L. Fasara - Slat Glace Decorative / Privacy Glazing Film:
 - 1. Ultraviolet Rejected (ASTM E 903): Not less than 99 percent.
 - 2. Visible Light Transmission (ASTM E 903, ASTM E308): Not more than 53 percent.
 - 3. Visible Light Rejected (ASTM E 903): Not less than 15 percent.
 - 4. Solar Heat Reduction: Not less than 12 percent.
 - 5. Shading Coefficient at 90 Degrees (Normal Incidence) (ASTM E 903): Not less than 0.68.

- M. Fasara - Pixela Decorative / Privacy Glazing Film:
 - 1. Ultraviolet Rejected (ASTM E 903): Not less than 99 percent.
 - 2. Visible Light Transmission (ASTM E 903, ASTM E 308): Not more than 57 percent.
 - 3. Visible Light Rejected (ASTM E 903): Not less than 17 percent.
 - 4. Solar Heat Reduction: Not less than 14 percent.
 - 5. Shading Coefficient at 90 Degrees (Normal Incidence) (ASTM E 903): Not less than 0.75.

- N. Fasara - Paracell Decorative / Privacy Glazing Film:
 - 1. Ultraviolet Rejected (ASTM E 903): Not less than 99 percent.
 - 2. Visible Light Transmission (ASTM E 903, ASTM E 308): Not more than 48 percent.
 - 3. Visible Light Rejected (ASTM E 903): Not less than 19 percent.
 - 4. Solar Heat Reduction: Not less than 15 percent.
 - 5. Shading Coefficient at 90 Degrees (Normal Incidence) (ASTM E 903): Not less than 0.69.

- O. Fasara - Radius Decorative / Privacy Glazing Film:
 - 1. Ultraviolet Rejected (ASTM E 903): Not less than 99 percent.
 - 2. Visible Light Transmission (ASTM E 903, ASTM E 308): Not more than 6 percent.
 - 3. Visible Light Rejected (ASTM E 903): Not less than 7 percent.
 - 4. Solar Heat Reduction: Not less than 6 percent.
 - 5. Shading Coefficient at 90 Degrees (Normal Incidence) (ASTM E 903): Not less than 0.25.

2.5 SINGLE PATTERNED FILM

- A. Fasara - Altair Decorative / Privacy Glazing Film:
 - 1. Ultraviolet Rejected (ASTM E 903): Not less than 99 percent.
 - 2. Visible Light Transmission (ASTM E 903, ASTM E 308): Not more than 52 percent.
 - 3. Visible Light Rejected (ASTM E 903): Not less than 16 percent.
 - 4. Solar Heat Reduction: Not less than 12 percent.
 - 5. Shading Coefficient at 90 Degrees (Normal Incidence) (ASTM E 903): Not less than 0.73.

- B. Fasara - Chamonix Decorative / Privacy Glazing Film:
 - 1. Ultraviolet Rejected (ASTM E 903): Not less than 99 percent.
 - 2. Visible Light Transmission (ASTM E 903, ASTM E 308): Not more than 47 percent.
 - 3. Visible Light Rejected (ASTM E 903): Not less than 29 percent.
 - 4. Solar Heat Reduction: Not less than 20 percent.
 - 5. Shading Coefficient at 90 Degrees (Normal Incidence) (ASTM E 903): Not less than 0.67.

- C. Fasara - Fine Crystal Decorative / Privacy Glazing Film:
 - 1. Ultraviolet Rejected (ASTM E 903): Not less than 99 percent.
 - 2. Visible Light Transmission (ASTM E 903, ASTM E 308): Not more than 83 percent.
 - 3. Visible Light Rejected (ASTM E 903): Not less than 8 percent.
 - 4. Solar Heat Reduction: Not less than 7 percent.
 - 5. Shading Coefficient at 90 Degrees (Normal Incidence) (ASTM E 903): Not less than 0.93.

- D. Fasara - Lausanne Decorative / Privacy Glazing Film:
 - 1. Ultraviolet Rejected (ASTM E 903): Not less than 99 percent.
 - 2. Visible Light Transmission (ASTM E 903, ASTM E 308): Not more than 82 percent.
 - 3. Visible Light Rejected (ASTM E 903): Not less than 9 percent.
 - 4. Solar Heat Reduction: Not less than 8 percent.
 - 5. Shading Coefficient at 90 Degrees (Normal Incidence) (ASTM E 903): Not less than 0.90.

- E. Fasara - Luce Decorative / Privacy Glazing Film:
 - 1. Ultraviolet Rejected (ASTM E 903): Not less than 99 percent.
 - 2. Visible Light Transmission (ASTM E 903, ASTM E 308): Not more than 31 percent.
 - 3. Visible Light Rejected (ASTM E 903): Not less than 25 percent.
 - 4. Solar Heat Reduction: Not less than 17 percent.
 - 5. Shading Coefficient at 90 Degrees (Normal Incidence) (ASTM E 903): Not less than 0.59.

- F. Fasara - Mat Crystal I Decorative / Privacy Glazing Film:
 - 1. Ultraviolet Rejected (ASTM E 903): Not less than 99 percent.
 - 2. Visible Light Transmission (ASTM E 903, ASTM E 308): Not more than 83 percent.
 - 3. Visible Light Rejected (ASTM E 903): Not less than 8 percent.
 - 4. Solar Heat Reduction: Not less than 8 percent.
 - 5. Shading Coefficient at 90 Degrees (Normal Incidence) (ASTM E 903): Not less than 0.91.

- G. Fasara - Milky White Decorative / Privacy Glazing Film:
 - 1. Ultraviolet Rejected (ASTM E 903): Not less than 99 percent.
 - 2. Visible Light Transmission (ASTM E 903, ASTM E 308): Not more than 59 percent.
 - 3. Visible Light Rejected (ASTM E 903): Not less than 17 percent.
 - 4. Solar Heat Reduction: Not less than 21 percent.
 - 5. Shading Coefficient at 90 Degrees (Normal Incidence) (ASTM E 903): Not less than 0.75.

- H. Fasara - Opaque White Decorative / Privacy Glazing Film:
1. Ultraviolet Rejected (ASTM E 903): Not less than 99 percent.
 2. Visible Light Transmission (ASTM E 903, ASTM E 308): Not more than 6 percent.
 3. Visible Light Rejected (ASTM E 903): Not less than 52 percent.
 4. Solar Heat Reduction: Not less than 41 percent.
 5. Shading Coefficient at 90 Degrees (Normal Incidence) (ASTM E 903): Not less than 0.29.
- I. Fasara - Oslo Decorative / Privacy Glazing Film:
1. Ultraviolet Rejected (ASTM E 903): Not less than 99 percent.
 2. Visible Light Transmission (ASTM E 903, ASTM E 308): Not more than 77 percent.
 3. Visible Light Rejected (ASTM E 903): Not less than 9 percent.
 4. Solar Heat Reduction: Not less than 8 percent.
 5. Shading Coefficient at 90 Degrees (Normal Incidence) (ASTM E 903): Not less than 0.89.
- J. Fasara - Rikyu Decorative / Privacy Glazing Film:
1. Ultraviolet Rejected (ASTM E 903): Not less than 99 percent.
 2. Visible Light Transmission (ASTM E 903, ASTM E 308): Not more than 47 percent.
 3. Visible Light Rejected (ASTM E 903): Not less than 18 percent.
 4. Solar Heat Reduction: Not less than 13 percent.
 5. Shading Coefficient at 90 Degrees (Normal Incidence) (ASTM E 903): Not less than 0.69.
- K. Fasara - Sagano Decorative / Privacy Glazing Film:
1. Ultraviolet Rejected (ASTM E 903): Not less than 99 percent.
 2. Visible Light Transmission (ASTM E 903, ASTM E 308): Not more than 53 percent.
 3. Visible Light Rejected (ASTM E 903): Not less than 16 percent.
 4. Solar Heat Reduction: Not less than 12 percent.
 5. Shading Coefficient at 90 Degrees (Normal Incidence) (ASTM E 903): Not less than 0.75.
- L. Fasara - Milky Milky Decorative / Privacy Glazing Film:
1. Ultraviolet Rejected (ASTM E 903): Not less than 99 percent.
 2. Visible Light Transmission (ASTM E 903, ASTM E 308): Not more than 28 percent.
 3. Visible Light Rejected (ASTM E 903): Not less than 27 percent.
 4. Solar Heat Reduction: Not less than 42 percent.
 5. Shading Coefficient at 90 Degrees (Normal Incidence) (ASTM E 903): Not less than 0.55.
- M. Fasara - Vega Decorative / Privacy Glazing Film:
1. Ultraviolet Rejected (ASTM E 903): Not less than 99 percent.
 2. Visible Light Transmission (ASTM E 903, ASTM E 308): Not more than 49 percent.
 3. Visible Light Rejected (ASTM E 903): Not less than 16 percent.
 4. Solar Heat Reduction: Not less than 12 percent.
 5. Shading Coefficient at 90 Degrees (Normal Incidence) (ASTM E 903): Not less than 0.71.
- N. Fasara - Yamato Decorative / Privacy Glazing Film:
1. Ultraviolet Rejected (ASTM E 903): Not less than 99 percent.
 2. Visible Light Transmission (ASTM E 903, ASTM E 308): Not more than 52 percent.
 3. Visible Light Rejected (ASTM E 903): Not less than 15 percent.
 4. Solar Heat Reduction: Not less than 11 percent.
 5. Shading Coefficient at 90 Degrees (Normal Incidence) (ASTM E 903): Not less than 0.75.
- O. Fasara - Linen Decorative / Privacy Glazing Film:

1. Ultraviolet Rejected (ASTM E 903): Not less than 99 percent.
 2. Visible Light Transmission (ASTM E 903, ASTM E 308): Not more than 62 percent.
 3. Visible Light Rejected (ASTM E 903): Not less than 15 percent.
 4. Solar Heat Reduction: Not less than 12 percent.
 5. Shading Coefficient at 90 Degrees (Normal Incidence) (ASTM E 903): Not less than 0.74.
- P. Fasara - Essen Decorative / Privacy Glazing Film:
1. Ultraviolet Rejected (ASTM E 903): Not less than 99 percent.
 2. Visible Light Transmission (ASTM E 903, ASTM E 308): Not more than 55 percent.
 3. Visible Light Rejected (ASTM E 903): Not less than 23 percent.
 4. Solar Heat Reduction: Not less than 19 percent.
 5. Shading Coefficient at 90 Degrees (Normal Incidence) (ASTM E 903): Not less than 0.67.
- Q. Fasara - Glace Decorative / Privacy Glazing Film:
1. Ultraviolet Rejected (ASTM E 903): Not less than 99 percent.
 2. Visible Light Transmission (ASTM E 903, ASTM E 308): Not more than 55 percent.
 3. Visible Light Rejected (ASTM E 903): Not less than 15 percent.
 4. Solar Heat Reduction: Not less than 12 percent.
 5. Shading Coefficient at 90 Degrees (Normal Incidence) (ASTM E 903): Not less than 0.69.
- R. Fasara - Mat Crystal 2 Decorative / Privacy Glazing Film:
1. Ultraviolet Rejected (ASTM E 903): Not less than 99 percent.
 2. Visible Light Transmission (ASTM E 903, ASTM E 308): Not more than 85 percent.
 3. Visible Light Rejected (ASTM E 903): Not less than 7 percent.
 4. Solar Heat Reduction: Not less than 6 percent.
 5. Shading Coefficient at 90 Degrees (Normal Incidence) (ASTM E 903): Not less than 0.92.

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.

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.

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