SECTION 08871 SUN CONTROL WINDOW FILM

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

The General Provisions of the contract, including the General Provisions for Construction Projects (2016), Special Provisions, and General Requirements of the Specifications, apply to the work specified in this section.

1.02 SECTION INCLUDES

Sun control window films of the following types:

A. Prestige sun control film.

1.03 RELATED SECTIONS

A. Section 07900 – SEALANTS

1.04 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.

C. NFRC 100/200 (Formerly ASTM E903) - Standard Methods of Test for Solar Absorbance, Reflectance and Transmittance of Materials Using Integrating Spheres.

D. Window 6.3 - A Computer Tool for Analyzing Window Thermal Performance; Lawrence Berkeley Laboratory.

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

F. IES LM-83-12: IES Spatial Daylight Autonomy (sDA) and Annual Sunlight Exposure.

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

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

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

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

1.05 DEFINITIONS

Light to Solar Gain Ratio: The ratio of visible light transmission to Solar Heat Gain Coefficient.

1.06 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.

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.

1.07 SUBMITTALS

A. Submit under provisions of Section 01300 – SUBMITTALS.

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: Furnish two samples representing actual product, color, and patterns per Section 2.02, Part B.

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.

1.08 QUALITY ASSURANCE

A. Manufacturer Qualifications: All primary products specified in this section will be supplied by a single manufacturer with a minimum of ten (10) 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 (5) 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.

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. Minimum area shall be large enough to provide an accurate representation of what is to be installed. Minimum area 24” x 24”.

1. Finish area 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.

1.09 DELIVERY, STORAGE, AND HANDLING

A. Follow manufacturer's instructions for storing and handling.

B. Store products in manufacturer's unopened packaging until ready for installation.

1.10 PROJECT CONDITIONS

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.

1.11 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

2.01 MANUFACTURERS

Acceptable Manufacturers:

A. 3M Commercial Solutions, which is located at: 3M Center Bldg. 220-12-E-04; St. Paul, MN 55144-1000; Toll Free Tel: 888-650-3497; Tel: 651-737-1081;

B. CoolVu which is located at 4939 Lower Roswell Rd. Bldg B, Marietta, GA 30068 Toll Free Tel: 844-426-6588

C. Substitutions: Permitted in accordance with the General Provisions and Special Provisions.

2.02 EXTERIOR SERIES SUN CONTROL FILM

A. Physical Properties:

1. Composition Exterior Prestige Series: Optically clear polyester film containing at least 220 layers and incorporating pressure sensitive adhesive on one side and an exterior weatherable abrasion resistant coating on the other. Nanotechnology represents a breakthrough in technology due to the enhanced heat, UV and IR rejection, without the presence of any metals. The film does not contain dyes.

3. Uniformity: No noticeable pin holes, streaks, thin spots, scratches, banding or other optical defects.

4. Variation in Total Transmission across the Width: Less than 2 percent over the average at any portion along the length.

5. Thickness: Nominal 2.0 mils (0.1 mm) with no evidence of coating voids.

6. Identification: Labeled as to Manufacturer as listed in this Section.

B. Performance, Exterior Prestige 90 - Clear Film, nanotechnology, no metal and at least 220 plus layers applied to 1/4 Inch (6.4 mm) Thick Clear Glass:

1. Visible Light Transmission (NFRC 100/200): 88 percent.

2. Visible Reflection - Exterior (NFRC 100/200): 9 percent.

3. Visible Reflection - Interior (NFRC 100/200): 9 percent.

4. Ultraviolet Rejected (NFRC 100/200): 99.9 percent.

5. Infrared Energy Rejected (NFRC 100/200): up to 97 percent; as measured between 900-1000 nm.

6. Light to Solar Gain Ratio: 1.4.

7. Solar Heat Gain Coefficient at 90 Degrees (Normal Incidence) (NFRC 100/200): 0.64.

8. Total Solar Energy Rejected (TSER) at 90 Degrees (Normal Incidence) (NFRC 100/200): 36 percent.

PART 3 – EXECUTION

3.01 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.

3.02 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

3.03 INSTALLATION, GENERAL

A. General: Install in accordance with manufacturer's instructions and the following.

1. 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.

2. 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.

3. Apply film to glass and lightly spray film with slip solution.

4. Squeegee from top to bottom of window.

5. Bump film edge with lint-free towel wrapped around edge of a 5-way tool.

6. 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.

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

3.04 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.

PART 4 – MEASUREMENT AND PAYMENT

4.01 BASIS OF MEASUREMENT AND PAYMENT

Work under this section will not be measured nor paid for separately, but shall be considered incidental to and included in the price bid for the various items of work in this project.

END OF SECTION