

**DEFENDOR AG 04**  
SECTION 08 87 23.16  
ANTI GRAFFITI FILMS

**PART 1 – GENERAL**

**1.1 SUMMARY**

- A. Optically clear neutral “peel and replace” protective polyester film for graffiti control.

**1.2 RELATED SECTIONS**

- A. Section 08 41 13 – Aluminum-Framed Entrances and Storefronts: Glazing system to receive graffiti control film.
- B. Section 08 81 00 – Glass Glazing: Glass and glazing materials to receive solar control film.

**1.3 REFERENCES**

- A. American Society for Testing and Materials (ASTM), latest edition:
1. D1044 - Standard Test Method for Resistance of Transparent Plastics to Surface Abrasion.
  2. E903 – Standard Test Method for Solar Absorptance, Reflectance, and Transmittance of Materials Using Integrating Spheres.
  3. E308 – Standard Practice for Computing the Colors of Objects by Using the CIE System.
  4. D882 – Standard Test Method for Tensile Properties of Thin Plastic Sheeting
  5. D3330 – Standard Test Method for Peel Adhesion of Pressure Sensitive Tape
- B. National Fenestration Rating Council (NFRC), latest edition:
1. 100: U-Factors; expressed as Btu/ sq. ft. x h x deg F (W/sq. m x K)
  2. 200: Solar Heat Gain Coefficient.

3. 302: Optical Spectral Data Verification Program
- C. Optics/Window 6.0 – A computer tool for Analyzing Window Thermal Performance; Lawrence Berkeley Laboratory.

#### **1.4 ACTION SUBMITTALS**

- A. Submit in accordance with requirements of Section 01 33 00.
- B. Product Data: Submit manufacturer's product data for each type of window film specified.
- C. Samples: Submit 12-inch square sample of each window film [and color] specified for verification purposes.

#### **1.5 CLOSEOUT SUBMITTALS**

- A. Operation and Maintenance Data: Submit manufacturer's maintenance data for each Anti-Graffiti film installed for inclusion in Operation and Maintenance Manuals.

#### **1.6 QUALITY ASSURANCE**

- A. Abrasion resistance test results:
  1. ASTM D1044: CS10 abrasive wheels, 500 gram weight, 50 cycles, increase in haze is less than 5%.
  2. EN15752-1 Glass in building - Adhesive backed polymeric film: CS10 abrasive wheels 1,000 gram weight, 100 cycles, increase in haze is less than 16%.
- B. Mock Ups: Build mockups to verify selections made under sample submittals and to evaluate surface preparation techniques and application workmanship.
  1. Construct mockups in the location and of the size indicated or, if not indicated, as directed by Architect.
  2. Approved mock ups may remain as a part of the completed Work if undisturbed at time of Substantial Completion.
- C. Preinstallation Conference: Conduct conference at project site to discuss methods and procedures relating to the installation of solar control films.

## **1.7 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver graffiti control films to Project Site in manufacturer's unopened packaging.
- B. Store and protect graffiti control films in compliance with manufacturer's directions and as required to prevent damage to materials from condensation, temperature changes, direct exposure to sun, or other causes.

## **1.8 FIELD CONDITIONS**

- A. Environmental Conditions: Do not proceed with application of graffiti control films when ambient and substrate temperature conditions are outside the limits permitted by film manufacturer or when substrates are wet from rain, frost, condensation, or other causes.

## **1.9 WARRANTY**

- A. Manufacturer's Warranty: Manufacturer's standard limited warranty in which manufacturer agrees to repair or replace materials that do not comply with requirements or fail in materials or workmanship within the specified warranty period.
  - 1. Anti Graffiti film is used for exterior applications, warranted for a period of two (2) years.
- B. Installer's Warranty: Installer's standard form in which installer agrees to repair or replace graffiti control films that do not comply with requirements or fail in workmanship within the specified warranty period and shall be included with the contract for installation.

## **PART 2 – PRODUCTS**

### **2.1 MANUFACTURERS**

- A. Acceptable Manufacturer: Johnson Laminating & Coating Inc.; 20631 Annalee, Carson, CA 90746; (310) 635-4929; [www.johnsonlaminating.com](http://www.johnsonlaminating.com).
- B. Substitutions: Not allowed.

## 2.2 DESCRIPTION

- A. Anti-Graffiti Film: Optically clear neutral “peel and replace” protective polyester film, with an abrasion resistant coating on one side and a mounting adhesive on the other.
1. Uniformity: No noticeable visual defects, such as pinholes, streaks, thin spots, scratches, or banding. In accordance with the IWFA visual acceptance standard, after installation.
  2. Variation in Solar Specifications across Width: +/- 3 % average at any portion of the length.
  3. Thickness: Nominal 4 mils (101.6 microns) with no evidence of coating voids, after the removal of the release liner.
  4. Identification: Labeled in accordance with manufacturer’s specifications.
  5. CST™ scratch-resistant hardcoat to protect glass and other surfaces from graffiti, keying and other types of scratches.

## 2.3 GRAFFITI CONTROL FILM PERFORMANCE CRITERIA

- A. General: Solar specifications represent film mounted to 1/8 inch (3mm) clear glass, unless noted otherwise.
- B. Defendor AG04: Capacities in accordance with ASTM E903:
1. Film Color: Clear
  2. Visible Light Transmission: 87%
  3. Solar Energy Rejected/Heat Reduction: 16%
  4. Visible Light Reflectance (Exterior): 9%
  5. Visible Light Reflectance (Interior): 9%
  6. Shading Coefficient: 0.96
  7. Solar Hear Gain Coefficient: 0.84
  8. U Factor: 1.07

9. Solar Energy Absorption: 10%

10. Solar Transmission: 81%

11. Solar Reflectance: 9%

12. UV Rejection: 98%

13. Glare Reduction: 1%

14. ASTM D882 - Tensile Stress

Coated Product:

Machine Direction: 18,900 PSI

Transverse Direction: 24,800 PSI

Base Film:

Machine Direction: 27,000 PSI

Transverse Direction: 29,000 PSI

ASTM D882 – Break Strength

Machine Direction: 84 PLI

Transverse Direction: 104 PLI

ASTM D882 - % Elongation at Break

Coated Product:

Machine Direction: 93%

Transverse Direction: 45%

Base Film:

Machine Direction: 180%

Transverse Direction: 140%

15. Peel Strength: ASTM D3330: >5 lbs/inch

## **PART 3 – EXECUTION**

### **3.1 EXAMINATION**

- A. Examine glazing system for upgrade viability prior to installation of window film.

- B. Verify satisfactory glass quality, sufficient edge bite and spacing, and elasticity of gasket material. Glass substrate should be free of defects, imperfections or damage of any kind including broken, chipped, cracked, or abraded areas.
- C. Verify frame and gasket are of satisfactory condition so as to not interfere with installation or typical thermal expansion and contraction of glazing system.
- D. Any unsatisfactory conditions must be corrected prior to proceeding with installation.

### **3.2 PREPARATION**

- A. Comply with manufacturer's instructions for recommended surface preparation, cleaning and protection of the entire fenestration system.
- B. Prior to installation, clean glass thoroughly. Use mounting solution (recommended content: one capful of baby shampoo to 1 gallon of water) along with tools such as; squeegees, scrub pads, lint free towels and scrapers to ensure the glass surface is clean and smooth.
  - 1. Ensure surface is free of any decals, debris, and dirt.
  - 2. Clean frames and gasket material with towels and solution.
  - 3. Use a final "spray and squeegee" cleaning to control dust as needed.
- C. Protect window frames and adjacent surfaces to prevent damage from water used during cleaning and installation. Use towels, tape, drop cloths and any other means recommended by manufacturers of adjacent materials to protect floors, walls and frames.

### **3.3 GRAFFITI CONTROL FILM APPLICATION**

- A. Install window film in accordance with manufacturer's instructions.
- B. Thoroughly clean and dry glazing system.
- C. Cut film neatly and square to a slightly larger size than the exposed glass area.
- D. Remove release liner and spray both adhesive and glass surface with mounting solution to permit positioning on glass. Place film with adhesive side on glass, ensuring entire glass surface is covered.

- E. Spray outside surface with solution and squeegee film into place working from the center outward and from the top down, stopping a few inches from the edges.
- F. Trim film to align with edges of exposed glazing, leaving approximately 1/16" to 1/8" gap from the edge of the film to the gasketing of the window system to permit edge lay down. Use sharp blades recommended for this purpose. Replace blade after approximately 4 cuts.
- G. Repeat spraying and squeegee procedure, vigorously moving water from center to right and left edges working from top down to bottom.
- H. "Bump" edges by applying firm pressure to force water out the edge using a hard card wrapped with a paper towel to ensure anchorage of the film edges.
- I. Once installation is complete, clean work area thoroughly.
- J. While some water may remain between the film and glass surface for up to 30 days, excessive amounts must be addressed immediately according to manufacturer's instructions.

### **3.4 SITE QUALITY CONTROL**

- A. After installation and dry out period, film shall meet the IWFA visual acceptance standard. In general, the film shall appear uniform and unobtrusive when viewed from 10 feet. The film shall be free of physical defects such as wrinkles, creases, cuts or pinholes. The edges shall be consistent and appropriately distanced from frame.
- B. If installed film does not meet visual acceptance standard criteria, remove and replace with new film.

### **3.5 CLEANING**

- A. Dry and thoroughly clean work area.
- B. Window film may be cleaned with standard household glass cleaners following the 30 day dry out period. Do not use abrasives or chemicals not specifically intended for glass. The soap based mounting solution described above is recommended.

Soft cloths or synthetic sponges are recommended; use a squeegee for removing the solution.

- C. Construction Waste Management: Manage construction waste in accordance with provisions of Division 1 Section 'Construction Waste Management'.
- D. Replace damaged graffiti control film before Substantial Completion.

END OF SECTION

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