

## Specifications

### FILM

3. The Ultra safety and security films when installed should (HD) have the following specifications and certifications as minimum. Base Polyester Composition The glass fragment retention window film shall be a polyester composite material. The base polyester composite shall be an optically clear, biaxially oriented, polyester composite based upon polyethylene terephthalate (PET) such as ICI Melinex "A" Grade, or other Industry accepted polyester composite having proven equivalent or better optical strength and life properties.

- a) The base polyester or laminated layers thereof shall have a thickness not less than 7-mil excluding adhesive and release liner or specialty manufactured 4 mil film or an approved equivalent film thickness.
- b) The Ultra safety and security films when installed should provide hazard level 3b or better, as specified in Category "C" office buildings.
- c) Impact – ANSI Z 97.1
- d) Hurricane – ASTM E – 1996
- e) Blast Mitigation - Large scale explosive open-air test (ASTM F 1642-96) - Level 2
- f) Accelerated weathering – ASTM G 26-95;
- g) Puncture strength \_ASTM D 4830 88
- h) Tear Strength ASTM D –1004
- i) Surface Burn Characteristics – ASTM E-84
- j) Total solar energy Transmitted 78%
- k) Total solar energy Reflected 10%
- l) Total solar energy Absorbed 12%
- m) Daylight Transmitted 83%
- n) Daylight Reflected 12%
- o) "U" factor Median 1.08
- p) UV light rejected 99%
- q) Shading coefficient .93
- r) Total solar energy rejected 19%
- s) Film minimum thickness .006"
- t) Structure multi-ply laminate or equivalent
- u) Tensile strength minimum 25,000 PSI
- v) Strength to pass impact level of 400 ft lb in accordance to ANSI Z97.1
- w) Nominal break strength (ASTM D882 95a in Lbs./inch 180 lbs (32.1 kg/cm)
- x) Minimum puncture propagation tear (ASTM D 2582 – 93 inch lb - 18.5 Lbs (8.4 kg)
- y) Adhesive peel strength > 2,500 gr/inch (> 984 gr/cm)
- z) Safety impact test Unlimited on 1/8" - 1/4" (3mm - 6mm) glass

4. When tested in accordance with ASTM D 882 or ASTM D 638, polyester composite strength and elongation measured at a strain rate not exceeding 50% per minute shall be not less than the following:

- a) Yield strength: 12,000 lbs/in<sup>2</sup>
- b) Elongation at yield: 3%
- c) Longitudinal tensile strength: 22,000 psi
- d) Transverse tensile strength: 25,000 psi
- e) Longitudinal elongation at break: 90%
- f) Transverse elongation at break 75%

#### **ADHESIVE**

5. The adhesive shall be optically clear, pressure sensitive, acrylic adhesive containing ultraviolet absorbers sufficient to protect the product for its life. Warranty to include:

- a) Maintaining adhesion properties without blistering, bubbling or delaminating from glass.
- b) Maintaining appearance without discoloration.
- c) Other manufacturing defects.

#### **Fire Resistance**

6. The polyester composite shall meet or exceed the following criteria :

- a) Class A, ASTM E84-91
- b) Smoke Release: Class A,
- c) E84-91a ASTM

#### **Visible Light Transmission**

7. Visible light transmission of the polyester composite shall not be less than 83%.

#### **Ultraviolet Properties**

8. Ultraviolet Transmission Ultraviolet absorbers contained in the adhesive shall be sufficient to protect the polyester composite for its life and shall limit ultraviolet transmission to not more than 5%.

#### **Roll Width**

9. The polyester composite shall preferably be available in multiple roll widths with a width of not less than 72 inches in order to minimize joints.

### **Delivery Storage and Handling**

10. Protect glazing film according to manufacturer's written instructions and as needed to prevent damage condensation, temperature changes, direct exposure to sun or other situations that may damage or impair film.

### **Identification**

11. Each roll of polyester composite must have a tamper proof label, which gives full details of the roll and batch numbers, etc. Each roll is to be uniquely identified. The same information must also be on the outside of the box. Sufficient information is to be available on the label to enable a full audit trail of the polyester composite to be maintained by the Vendor. This will enable the vendor to ensure that the correct polyester composite is being provided. Polyester composite type is not to be changed during the life of the contract unless expressly agreed to in writing by DPKO

### **Manufacturer's Qualification**

12. Certification by manufacturer, that manufacturer has minimum of three (3) years experience in the production of materials similar to those required and that all film for the contract will be from a single manufacturer.

### **Cleaning Care**

13. Provide written cleaning and care instructions for all glazing that has been upgraded with a security film product.

### **System Performance**

14. Vendors are to submit explosive testing results for the security window film in a daylight application. Provide test results in accordance with ISO or other Internationally recognized Standard for glazing and glazing systems subjected to airblast loadings. Test should have been conducted for blast pressure of 4 P.S.I. and a blast impulse of 28 P.S.I.-Msec.

7. A Conformity check list to all above specifications is required.