SECTION 088754

BLAST EVENT SAFETY GLAZING FILMS
SCL SR PS7

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes film products applied to glass surfaces to impart safety characteristics when glass is subjected to a blast event.

1.02 DEFINITIONS

A. Dual Reflective Films: Films where interior visible light reflectance is less than the exterior visible light reflectance. The lower interior reflectance provides improved visibility from the interior to the outdoors without affecting the film's solar performance.

B. Emissivity: The ability of a surface to absorb far-infrared heat and to reflect it. The lower the emissivity, the lower the far-infrared heat absorption and the greater the far-infrared heat reflectance.

C. Far-Infrared Heat: Heat radiated from objects at temperatures below 1300 deg F such as heat radiated from: room objects, objects heated by the sun, or a home heating system. Far-infrared heat is different from near-infrared heat that is heat radiated from objects at highly elevated temperatures such as the sun.

D. Low Emissivity (Low-E) Films: Films with improved far-infrared heat reflection, with the ability to reduce winter heat loss through windows. The reflection of far-infrared heat also reduces the need for summer cooling by reducing the transmission of far-infrared heat from outdoor objects through windows into the interior of a home or building.

E. Low Reflectance Films: Films whose visible light reflectance values are very close to that of ordinary glass.

F. Luminous Efficacy: Ratio of visible light transmission to shading coefficient for a glazing system.

G. Neutral Solar Films: Films that allow visible light to pass without distortion of color and that have equal visible light transmission properties at all wavelengths in the visible range from 380 to 780 nanometers.

H. Light to Solar Heat Gain Ratio: Ratio of visible light transmission to Solar Heat Gain Coefficient for a glazing system.

I. Solar Heat Gain Coefficient: The fraction of incident solar radiation that actually passes through that window, including solar energy that is both directly transmitted and that which

is absorbed and subsequently released inwardly by re-radiation and conduction. SHGC is expressed as a number between 0 and 1. The lower a window's solar heat gain coefficient, the less solar heat it transmits. This number is the mathematical complement of the TSER value: The sum of the TSER (Total Solar Energy Rejection, in decimal form) of a glazing system and its SHGC value is 1; therefore, 1 - TSER = SHGC

J. Spectrally Selective Solar Films: Films that reduce solar heat gain mainly by reducing the transmission of near-infrared solar radiation with minimal reduction of visible light transmission. Films with a Light to Solar Heat Gain Ratio of above 1.00 are spectrally selective.

1.03 REFERENCES

A. The following standards are referenced in this Section
1. ANSI Z97.1, “Safety Glazing Materials Used in Buildings—Safety Performance Specifications and Methods of Test.”
2. ASTM E-84, "Test Method for Surface Burning Characteristics of Building Materials".
3. ASTM D 882, “Standard Test Method for Tensile Properties of Thin Plastic Sheeting.”
4. ASTM E 903, “Test Method for Solar Absorptance, Reflectance, and Transmittance of Materials Using Integrating Spheres”
5. ASTM D 1044, “Test Method for Resistance of Transparent Plastics to Surface Abrasion.”
6. ASTM D 3330, “Standard Test Methods for Peel-Adhesion at 180 Degree Angle”.
7. ASTM D 4830, “Standard Test Methods for Characterizing Thermoplastic Fabrics Used in Roofing and Waterproofing. Section 7: Puncture Strength.”
8. Consumer Product Safety Commission (CPSC) 16 CFR 1201, “Safety Standard for Architectural Glazing Materials.”
9. US General Service Administration (GSA-TS01-2003) “Standard Test Method for Glazing and Window Systems Subject to Dynamic Overpressure Loadings”.

1.04 PERFORMANCE REQUIREMENTS

A. Thermal and Optical Performance Properties: Provide glazing films with the following thermal and optical performance properties (on 1/8 inch clear glass) as determined according to procedures indicated in ASHRAE Handbook of Fundamentals:

1.	Solar Energy Rejected:	16%
2.	Shading Coefficient:	.96
3.	Solar Reflectance:	9%
4.	Solar Absorptance:	10%
5.	Solar Transmittance:	81%
6.	Visible Light Transmittance:	88%
7.	U-Value (winter median):	1.03
8.	Emissivity:	.84
9.	Luminous Efficacy:	.92
10.	Light to Solar Heat Gain Ratio:	1.05
11.	Solar Heat Gain Coefficient:	.84
12.	Ultraviolet Transmission:	<5%

Provide films with UV absorbing materials that limit the weighted UV transmission to less than 5 percent when measured in accordance with ASTM E 903.

B. Scratch Resistance: Provide films that have 5.0 percent maximum haze increase when tested to ASTM D 1044, using 100 revolutions, a CS-10F Taber abrading wheel and 500 g weights.

C. Impact Resistance: Provide films that when applied to either 1/8 inch or 1/4 inch annealed glass pass the impact test requirements for ANSI Z97.1 (400 foot-pounds) and CPSC 16 CFR 1201 Category II, provided the specimens are allowed to exit the test frame.

D. Surface Burning Characteristics: Provide films that have Flame Spread Index of 0 and Smoke Development Index of 30 or less when tested in accordance to ASTM E 84.

E. Puncture Strength of 145 lbs under ASTM D4830.

F. Tensile Properties: When measured in accordance with ASTM D 882

1. Minimum Tensile Strength of film: 32,000 psi. (as reported by Polyester Supplier – average).
2. Minimum Elongation at Break: 100%.
3. Minimum Break Strength: 211 lb/in.

G. United States General Services Administration (GSA) Performance Criteria: Provide films that have GSA, Level (2)(3) performance criteria, or better, subject to the following restrictions:
1. Test on 1/4 inch nominal annealed or 1/4 inch nominal tempered glass.
2. Attachment System: 4-side Frame/Lok, 4-side Wet Glaze.
3. Blast Testing Test Structures: Enclosed test structures. No open frame tests allowed.
4. Type of Test: Open-air, with explosives. No shock-tube tests allowed.
5. Nominal Peak Pressure: Minimum of 4.0 psi with minimum impulse of 28 psi-msec.

1.05 SUBMITTALS

A. Product Data (on 1/8 inch clear glass): For each film product indicated.

B. Samples for Verification: 12-inch square samples of each glazing film, of each product color specified.

C. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

D. Closeout Submittals: Upon completion of the Work, submit the following;
1. Executed warranty.
2. Maintenance (cleaning) and replacement instructions.

1.06 QUALITY ASSURANCE

A. Manufacturer Qualifications: Engage a firm experienced in manufacturing systems similar to those indicated for this Project and meeting the standards of the International Standards Organization (ISO), ISO 9001 Quality Assurance in Production and Installation.

B. Installer Qualifications: Engage an experienced installer certified, licensed, or otherwise qualified by film manufacturer as having the necessary experience, staff, and training to install manufacturer's products according to specified requirements.

C. Mockups: Apply glazing films in locations as directed to verify selections made under sample Submittals and to demonstrate aesthetic effects and qualities of materials and execution.
   1. Obtain approval of field samples before continuing with remainder of installation.
   2. Maintain field samples during remainder of installation in an undisturbed condition as a standard for judging the completed Work.
   3. Approved field samples may become part of the completed Work.

D. Pre-installation Conference: Before installing glazing films, conduct conference at Project site. Conduct pre-installation conference in conjunction with installation of mockup.
   1. Meet with Owner, Architect, glazing film Installer and glazing film manufacturer's representative.
   2. Review methods and procedures related to installation, including manufacturer's written instructions.
   3. Examine substrate conditions for compliance with requirements.
   4. Review temporary protection measures required during and after installation.
   5. Document proceedings, including corrective measures or actions required, and furnish copy of record to each participant.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Protect glazing films according to manufacturer's written instructions and as needed to prevent damage condensation, temperature changes, direct exposure to sun, or other causes.

1.08 PROJECT CONDITIONS

A. Environmental Limitations: Do not proceed with film installation when ambient and substrate temperature conditions are outside limits permitted by manufacturer and when glass substrates are wet from frost, condensation, or other causes.

1.09 WARRANTY

A. Manufacturer's standard warranty agreeing to replace films that fail within 10 years from date of original installation.

PART 2 - PRODUCTS

2.01 MANUFACTURERS/PRODUCTS

A. Provide one of the products:
   1. CPFilms Inc.; LLumar Magnum Safety and Security Film.

B. Product Description: Multi-layered product, 7 mils thick, applied to interior glass surfaces, consisting of, from outboard surface to inboard surface:
   1. Removable release liner.
   2. Pressure sensitive adhesive.
   3. Clear, dyed or metallized layers of polyester film.
   4. Scratch resistant coating..

C. Colors: Clear.

2.02 GLAZING FILM ACCESSORIES

A. General: Provide products complying with requirements of glazing film manufacturer for application indicated, and with a proven record of compatibility with surfaces contacted in installation.

B. Adhesive: Pressure sensitive acrylic adhesive system.

C. Cleaners, Primers, and Sealers: Types recommended by glazing film manufacturer..

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine glass and surrounding adjacent surfaces for conditions affecting installation.
   1. Report conditions that may adversely effect installation. In report, include description of any glass that is broken, chipped, cracked, abraded, or damaged in any way.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

C. Beginning of installation means acceptance of conditions.

3.02 PREPARATION

A. Comply with manufacturer's written instructions for surface preparation.

B. Immediately before beginning installation of films, clean glass surfaces of substances that could impair glazing film's bond, including mold, mildew, oil, grease, dirt and other foreign materials.

C. Protect window frames and surrounding conditions from damage during installation.

3.03 INSTALLATION

A. General: Comply with glazing film manufacturers' written installation instructions applicable to products and applications indicated, except where more stringent requirements apply.
   1. Install film continuously, but not necessarily in one continuous length. Install with no gaps or overlaps.
      a. No seams allowed for Blast Hazard Mitigation applications. Contact manufacturer if installation requires a seam.
   2. Do not remove release liner from film until just before each piece of film is cut and ready for installation.
   3. Install film with mounting solution and custom cut to the glass with neat, square comers and edges to within 1/8 inch of the window frame.
   4. Install film absent bubbles, wrinkles, blisters, edge lifting and blemishes (within the installing technician's control).

B. After installation, view film from a distance of 10 feet against a bright uniform sky or background. Film shall appear uniform in appearance with no visible streaks, banding, thin spots or pinholes.
   1. If installed film does not meet this criteria, remove and replace with new film.

3.04 CLEANING

A. Remove excess mounting solution at finished seams, perimeter edges, and adjacent surfaces.

B. Use cleaning methods recommended by glazing film manufacturer.

C. Replace films that cannot be cleaned.

END OF SECTION