

LLumar® Safety-and-Security Series

Note: Click on "Show/Hide ¶" button to reveal "Specifier Notes" throughout section. Delete this text when editing is complete.

PART 1 - GENERAL

1.1 CONDITIONS AND REQUIREMENTS

- A. The General Conditions, Supplementary Conditions, and Division 01 – General Requirements apply.

1.2 SECTION INCLUDES

- A. Safety-and-security films
- B. [Insert item description.]

1.3 RELATED SECTIONS

- A. Section 08 80 00 - Glazing: Substrate for application of safety-and-security film.
- B. Section [xxxxx] – [Section Title]: [Include brief description of work specified in another section that is related to the work of this section.]

1.4 REFERENCES

- A. American National Standards Institute (ANSI):
 - 1. ANSI Z97.1 - Safety Glazing Materials Used in Buildings - Safety Performance Specifications and Methods of Test.
- B. ASTM International (ASTM):
 - 1. ASTM D882 - Standard Test Method for Tensile Properties of Thin Plastic Sheeting.
 - 2. ASTM D3330 - Standard Test Methods for Peel-Adhesion at 180 Degree Angle.
 - 3. ASTM D4830 - Standard Test Methods for Characterizing Thermoplastic Fabrics Used in Roofing and Waterproofing. Section 7: Puncture Strength.
 - 4. ASTM E84 - Test Method for Surface Burning Characteristics of Building Materials.
 - 5. ASTM E903 - Test Method for Solar Absorptance, Reflectance, and Transmittance of Materials Using Integrating Spheres.
- C. Consumer Products Safety Commission (CPSC):
 - 1. 16 CFR 1201 - Safety Standard for Architectural Glazing Materials.

1.5 DEFINITIONS

- A. 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.
- B. Far-Infrared Heat: Heat radiated from objects at temperatures below 1300 degrees 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.
- C. 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.
- D. Light to Solar Heat Gain Ratio: Ratio of visible light transmission to Solar Heat Gain Coefficient for a glazing system.
- E. Solar Heat Gain Coefficient (SHGC): 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 SHGC, the less solar heat it transmits. This number is the mathematical complement of the Total Solar Energy Rejection (TSER) value: The sum of the TSER (in decimal form) of a glazing system and its SHGC value is 1; therefore, $1 - \text{TSER} = \text{SHGC}$.

1.6 PERFORMANCE REQUIREMENTS

- A. Impact Resistance: Provide films that when applied to 1/8-inch annealed glass pass the impact test requirements of ANSI Z97.1 and CPSC 16 CFR 1201.
- B. Peel Strength: >2720 (>6) when tested in accordance with ASTM D3330.
- C. Puncture Strength: [45] [70] [79] [111] [145] [156] [187] [223] [78] [164] when tested in accordance with ASTM D4830.
- D. Surface Burning Characteristics: Provide films that have Class A ratings when tested in accordance with ASTM E84.
- E. Tensile Properties: When measured in accordance with ASTM D882.
 - 1. Minimum Tensile Strength of Film: 32,000 psi, average.
 - 2. Minimum Elongation at Break: >100 percent.
 - 3. Break Strength - Average Load: [56][120][135][181]230][266][269][324][472] lbs/in.
- F. Ultraviolet Transmission: Provide safety-and-security films with UV absorbing materials that limit the weighted UV Transmission to [6.0][3.0][2.0][1.0][less than 1.0] percent or less when measured according to ASTM E903.
- G. Provide safety-and-security films that do not have a masking sheet.

1.7 SUBMITTALS

- A. Submit under provisions of Section [01 33 00] [_____].
- B. Product Data: Submit for each product specified indicating:
 - 1. Performance properties.
 - 2. Preparation and installation instructions and recommendations.
 - 3. Storage and handling recommendations.
- C. Samples: For each type of safety-and-security film specified, two (2) samples, 12 inches square.
- D. Qualification Data: Submit documentation indicating qualifications of safety-and-security film manufacturer.
- E. Operation and Maintenance Data: Submit for safety-and-security control film to include in maintenance manuals.
- F. Warranty: Submit sample special warranty specified in this section.

1.8 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A qualified manufacturer that has a minimum of 10 years of documented experience manufacturing safety-and-security films similar to be used for this project.
- B. Installer Qualifications: A firm that is authorized by safety-and-security film manufacturer to install film in accordance with guidelines set forth by the manufacturer.
- C. Source Limitations: Obtain each type of safety-and-security film from same manufacturer.
- D. Mock-ups: Build mock-ups to verify selections made under sample submittals and to evaluate surface preparation techniques and application workmanship.
 - 1. Construct mock-ups in the location and of the size indicated or, if not indicated, as directed by Architect.
 - 2. Approved mock-ups may become part of the completed work if undisturbed at time of Substantial Completion.
- E. Pre-installation Conference: Conduct conference at project site to discuss methods and procedures relating to installation of the safety-and-security films.

1.9 DELIVERY, STORAGE AND HANDLING

- A. Deliver, store and handle materials in manufacturer's protective packaging.
- B. Store and protect materials according to manufacturer's written recommendations to prevent damage from condensation, temperature changes, direct exposure to sun, or other causes.

1.10 SITE CONDITIONS

- A. Ambient Conditions: Maintain temperature, humidity, and ventilation within limits recommended by manufacturer.

1.11 LIMITED WARRANTY

- A. Manufacturer's Limited Warranty: Certain restrictions apply. The Manufacturer's Limited Warranty can be viewed in full by [clicking here](#).

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis-of-Design Product: The design for safety-and-security films is based on LLumar® Safety-and-Security Films manufactured by an Eastman Chemical Company business: CPFilms Inc., 575 Maryville Centre Drive, St. Louis, Missouri 63141; Telephone: 800-255-8627; Email address: commercialalerts@eastman.com; Web Site: www.llumar.com.
- B. Representative: [Insert contact information.]
- C. Substitutions will be considered, subject to compliance with requirements of this section, under provisions of Section 01 60 00.

2.2 SAFETY-AND-SECURITY FILMS

- A. Safety-and-Security Film: LLumar® SCLSRPS2 Safety-and-Security Film with the following performance characteristics when applied to the interior surface of single-pane, 1/8-inch clear glass:

% Total Solar Transmittance	83
% Total Solar Reflectance	8
% Total Solar Absorptance	9
% Visible Light Transmission	89
% Visible Light Reflection - Exterior	9
% Visible Light Reflection - Interior	9
Winter U-Value	1.07
Shading Coefficient	0.99
% Ultraviolet Ray Protection (280nm-380nm)	94
Emissivity	0.90
Solar Heat Gain Coefficient	0.86
% Total Solar Energy Rejected	14
Light-to-Solar Heat Gain Ratio	1.03
% Summer Solar Heat Reduction	0
% Winter Heat Loss Reduction	-3
% Glare Reduction	1
Thickness without Liner	0.002 inches
Film Color	Clear

- B. Safety-and-Security Film: LLumar® SCLSRPS4 Safety-and-Security Film with the following performance characteristics when applied to the interior surface of single-pane, 1/8-inch clear glass:

% Total Solar Transmittance	82
% Total Solar Reflectance	10
% Total Solar Absorptance	8
% Visible Light Transmission	88
% Visible Light Reflection - Exterior	10
% Visible Light Reflection - Interior	10
Winter U-Value	1.05
Shading Coefficient	0.97
% Ultraviolet Ray Protection (280nm-380nm)	94
Emissivity	0.86
Solar Heat Gain Coefficient	0.84
% Total Solar Energy Rejected	16
Light-to-Solar Heat Gain Ratio	1.05
% Summer Solar Heat Reduction	2
% Winter Heat Loss Reduction	-1
% Glare Reduction	2
Thickness without Liner	0.004 inches
Film Color	Clear

- C. Safety-and-Security Film: LLumar® SCLSRPS6 Safety-and-Security Film with the following performance characteristics when applied to the interior surface of single-pane, 1/8-inch clear glass:

% Total Solar Transmittance	82
% Total Solar Reflectance	9
% Total Solar Absorptance	9
% Visible Light Transmission	89
% Visible Light Reflection - Exterior	10
% Visible Light Reflection - Interior	10
Winter U-Value	1.07
Shading Coefficient	0.97
% Ultraviolet Ray Protection (280nm-380nm)	99
Emissivity	0.90
Solar Heat Gain Coefficient	0.85
% Total Solar Energy Rejected	15
Light-to-Solar Heat Gain Ratio	1.05
% Summer Solar Heat Reduction	1
% Winter Heat Loss Reduction	-3
% Glare Reduction	1
Thickness without Liner	0.006 inches
Film Color	Clear

- D. Safety-and-Security Film: LLumar® SCLSRPS7 Safety-and-Security Film with the following performance characteristics when applied to the interior surface of single-pane, 1/8-inch clear glass:

% Total Solar Transmittance	82
% Total Solar Reflectance	8
% Total Solar Absorptance	10
% Visible Light Transmission	89
% Visible Light Reflection - Exterior	9
% Visible Light Reflection - Interior	9

Winter U-Value	1.06
Shading Coefficient	0.98
% Ultraviolet Ray Protection (280nm-380nm)	94
Emissivity	0.90
Solar Heat Gain Coefficient	0.85
% Total Solar Energy Rejected	15
Light-to-Solar Heat Gain Ratio	1.05
% Summer Solar Heat Reduction	1
% Winter Heat Loss Reduction	-2
% Glare Reduction	1
Thickness without Liner	0.007 inches
Film Color	Clear

- E. Safety-and-Security Film: LLumar® SCLSRPS8 Safety-and-Security Film with the following performance characteristics when applied to the interior surface of single-pane, 1/8-inch clear glass:

% Total Solar Transmittance	81
% Total Solar Reflectance	9
% Total Solar Absorptance	10
% Visible Light Transmission	89
% Visible Light Reflection - Exterior	10
% Visible Light Reflection - Interior	10
Winter U-Value	1.07
Shading Coefficient	0.97
% Ultraviolet Ray Protection (280nm-380nm)	99
Emissivity	0.90
Solar Heat Gain Coefficient	0.84
% Total Solar Energy Rejected	16
Light-to-Solar Heat Gain Ratio	1.06
% Summer Solar Heat Reduction	2
% Winter Heat Loss Reduction	-3
% Glare Reduction	1
Thickness without Liner	0.008 inches
Film Color	Clear

- F. Safety-and-Security Film: LLumar® SCLSRPS11 Safety-and-Security Film with the following performance characteristics when applied to the interior surface of single-pane, 1/8-inch clear glass:

% Total Solar Transmittance	80
% Total Solar Reflectance	9
% Total Solar Absorptance	11
% Visible Light Transmission	87
% Visible Light Reflection - Exterior	10
% Visible Light Reflection - Interior	10
Winter U-Value	1.06
Shading Coefficient	0.96
% Ultraviolet Ray Protection (280nm-380nm)	98
Emissivity	0.90
Solar Heat Gain Coefficient	0.84
% Total Solar Energy Rejected	16

Light-to-Solar Heat Gain Ratio	1.04
% Summer Solar Heat Reduction	2
% Winter Heat Loss Reduction	-2
% Glare Reduction	3
Thickness without Liner	0.011 inches
Film Color	Clear

- G. Safety-and-Security Film: LLumar® SCLSRPS15 Safety-and-Security Film with the following performance characteristics when applied to the interior surface of single-pane, 1/8-inch clear glass:

% Total Solar Transmittance	80
% Total Solar Reflectance	9
% Total Solar Absorptance	11
% Visible Light Transmission	87
% Visible Light Reflection - Exterior	10
% Visible Light Reflection - Interior	10
Winter U-Value	1.06
Shading Coefficient	0.95
% Ultraviolet Ray Protection (280nm-380nm)	99
Emissivity	0.90
Solar Heat Gain Coefficient	0.83
% Total Solar Energy Rejected	17
Light-to-Solar Heat Gain Ratio	1.05
% Summer Solar Heat Reduction	3
% Winter Heat Loss Reduction	-2
% Glare Reduction	3
Thickness without Liner	0.015 inches
Film Color	Clear

- H. Safety-and-Security Film: LLumar® R20SRPS4 Safety-and-Security Film with the following performance characteristics when applied to the interior surface of single-pane, 1/8-inch clear glass:

% Total Solar Transmittance	11
% Total Solar Reflectance	55
% Total Solar Absorptance	34
% Visible Light Transmission	15
% Visible Light Reflection - Exterior	60
% Visible Light Reflection - Interior	64
Winter U-Value	1.02
Shading Coefficient	0.24
% Ultraviolet Ray Protection (280nm-380nm)	>99
Emissivity	0.80
Solar Heat Gain Coefficient	0.21
% Total Solar Energy Rejected	79
Light-to-Solar Heat Gain Ratio	0.71
% Summer Solar Heat Reduction	76
% Winter Heat Loss Reduction	2
% Glare Reduction	83
Thickness without Liner	0.004 inches
Film Color	Clear

- I. Safety-and-Security Film: LLumar® R20SRPS8 Safety-and-Security Film with the following performance characteristics when applied to the interior surface of single-pane, 1/8-inch clear glass:

% Total Solar Transmittance	11
% Total Solar Reflectance	59
% Total Solar Absorptance	30
% Visible Light Transmission	15
% Visible Light Reflection - Exterior	64
% Visible Light Reflection - Interior	64
Winter U-Value	1.06
Shading Coefficient	0.24
% Ultraviolet Rejection	>99
Emissivity	0.87
Solar Heat Gain Coefficient	0.20
% Total Solar Energy Rejected	80
Light-to-Solar Heat Gain Ratio	0.75
% Summer Solar Heat Reduction	77
% Winter Heat Loss Reduction	-2
% Glare Reduction	83
Thickness without Liner	0.008 inches
Film Color	Clear

- J. Safety-and-Security Film: LLumar® N1020SRPS4 Safety-and-Security Film with the following performance characteristics when applied to the interior surface of single-pane, 1/8-inch clear glass:

% Total Solar Transmittance	23
% Total Solar Reflectance	22
% Total Solar Absorptance	55
% Visible Light Transmission	24
% Visible Light Reflection - Exterior	26
% Visible Light Reflection - Interior	27
Winter U-Value	1.06
Shading Coefficient	0.47
% Ultraviolet Rejection	>99
Emissivity	0.88
Solar Heat Gain Coefficient	0.41
% Total Solar Energy Rejected	59
Light-to-Solar Heat Gain Ratio	0.59
% Summer Solar Heat Reduction	52
% Winter Heat Loss Reduction	-2
% Glare Reduction	73
Thickness without Liner	0.004 inches
Film Color	Neutral

- K. Safety-and-Security Film: LLumar® N1020SRPS8 Safety-and-Security Film with the following performance characteristics when applied to the interior surface of single-pane, 1/8-inch clear glass:

% Total Solar Transmittance	23
% Total Solar Reflectance	22

% Total Solar Absorptance	55
% Visible Light Transmission	24
% Visible Light Reflection - Exterior	26
% Visible Light Reflection - Interior	27
Winter U-Value	1.06
Shading Coefficient	0.47
% Ultraviolet Rejection	>99
Emissivity	0.88
Solar Heat Gain Coefficient	0.41
% Total Solar Energy Rejected	59
Light-to-Solar Heat Gain Ratio	0.59
% Summer Solar Heat Reduction	52
% Winter Heat Loss Reduction	-2
% Glare Reduction	73
Thickness without Liner	0.008 inches
Film Color	Neutral

- L. Safety-and-Security Film: LLumar® N1040SRPS4 Safety-and-Security Film with the following performance characteristics when applied to the interior surface of single-pane, 1/8-inch clear glass:

% Total Solar Transmittance	38
% Total Solar Reflectance	14
% Total Solar Absorptance	48
% Visible Light Transmission	39
% Visible Light Reflection - Exterior	16
% Visible Light Reflection - Interior	17
Winter U-Value	1.06
Shading Coefficient	0.61
% Ultraviolet Rejection	>99
Emissivity	0.90
Solar Heat Gain Coefficient	0.53
% Total Solar Energy Rejected	47
Light-to-Solar Heat Gain Ratio	0.74
% Summer Solar Heat Reduction	38
% Winter Heat Loss Reduction	-2
% Glare Reduction	57
Thickness without Liner	0.004 inches
Film Color	Neutral

- M. Safety-and-Security Film: LLumar® N1040SRPS8 Safety-and-Security Film with the following performance characteristics when applied to the interior surface of single-pane, 1/8-inch clear glass:

% Total Solar Transmittance	38
% Total Solar Reflectance	14
% Total Solar Absorptance	48
% Visible Light Transmission	39
% Visible Light Reflection - Exterior	16
% Visible Light Reflection - Interior	17
Winter U-Value	1.06
Shading Coefficient	0.61

% Ultraviolet Rejection	>99
Emissivity	0.90
Solar Heat Gain Coefficient	0.53
% Total Solar Energy Rejected	47
Light-to-Solar Heat Gain Ratio	0.74
% Summer Solar Heat Reduction	38
% Winter Heat Loss Reduction	-2
% Glare Reduction	57
Thickness without Liner	0.008 inches
Film Color	Neutral

- N. Safety-and-Security Film: LLumar® N1050SRPS4 Safety-and-Security Film with the following performance characteristics when applied to the interior surface of single-pane, 1/8-inch clear glass:

% Total Solar Transmittance	48
% Total Solar Reflectance	10
% Total Solar Absorptance	42
% Visible Light Transmission	49
% Visible Light Reflection - Exterior	11
% Visible Light Reflection - Interior	14
Winter U-Value	1.07
Shading Coefficient	0.70
% Ultraviolet Rejection	>99
Emissivity	0.90
Solar Heat Gain Coefficient	0.61
% Total Solar Energy Rejected	39
Light-to-Solar Heat Gain Ratio	0.80
% Summer Solar Heat Reduction	29
% Winter Heat Loss Reduction	-3
% Glare Reduction	46
Thickness without Liner	0.004 inches
Film Color	Neutral

- O. Safety-and-Security Film: LLumar® N1050SRPS8 Safety-and-Security Film with the following performance characteristics when applied to the interior surface of single-pane, 1/8-inch clear glass:

% Total Solar Transmittance	48
% Total Solar Reflectance	10
% Total Solar Absorptance	42
% Visible Light Transmission	49
% Visible Light Reflection - Exterior	11
% Visible Light Reflection - Interior	14
Winter U-Value	1.07
Shading Coefficient	0.70
% Ultraviolet Rejection	>99
Emissivity	0.90
Solar Heat Gain Coefficient	0.61
% Total Solar Energy Rejected	39
Light-to-Solar Heat Gain Ratio	0.80
% Summer Solar Heat Reduction	29

% Winter Heat Loss Reduction	-3
% Glare Reduction	46
Thickness without Liner	0.008 inches
Film Color	Neutral

- P. Safety-and-Security Film: LLumar® NUV65SRPS4 Safety-and-Security Film with the following performance characteristics when applied to the interior surface of single-pane, 1/8-inch clear glass:

% Total Solar Transmittance	64
% Total Solar Reflectance	9
% Total Solar Absorptance	27
% Visible Light Transmission	69
% Visible Light Reflection - Exterior	10
% Visible Light Reflection - Interior	9
Winter U-Value	1.07
Shading Coefficient	0.83
% Ultraviolet Rejection	>99
Emissivity	0.90
Solar Heat Gain Coefficient	0.72
% Total Solar Energy Rejected	28
Light-to-Solar Heat Gain Ratio	0.96
% Summer Solar Heat Reduction	16
% Winter Heat Loss Reduction	-3
% Glare Reduction	23
Thickness without Liner	0.004 inches
Film Color	Neutral

- Q. Safety-and-Security Film: Vista™ by LLumar® Luminance V28SRPS8 Safety-and-Security Film with the following performance characteristics when applied to the interior surface of single-pane, 1/8-inch clear glass:

% Total Solar Transmittance	21
% Total Solar Reflectance	34
% Total Solar Absorptance	45
% Visible Light Transmission	27
% Visible Light Reflection - Exterior	35
% Visible Light Reflection - Interior	21
Winter U-Value	1.06
Shading Coefficient	0.41
% Ultraviolet Rejection	>99
Emissivity	0.88
Solar Heat Gain Coefficient	0.35
% Total Solar Energy Rejected	65
Light-to-Solar Heat Gain Ratio	0.77
% Summer Solar Heat Reduction	59
% Winter Heat Loss Reduction	-2
% Glare Reduction	70
Thickness without Liner	0.008 inches
Film Color	Neutral

- R. Safety-and-Security Film: Vista™ by LLumar® Mirage V38SRPS8 Safety-and-Security Film with the following performance characteristics when applied to the interior surface of single-pane, 1/8-inch clear glass:

% Total Solar Transmittance	31
% Total Solar Reflectance	25
% Total Solar Absorptance	44
% Visible Light Transmission	39
% Visible Light Reflection - Exterior	25
% Visible Light Reflection - Interior	18
Winter U-Value	1.06
Shading Coefficient	0.52
% Ultraviolet Rejection	>99
Emissivity	0.88
Solar Heat Gain Coefficient	0.45
% Total Solar Energy Rejected	55
Light-to-Solar Heat Gain Ratio	0.87
% Summer Solar Heat Reduction	48
% Winter Heat Loss Reduction	-2
% Glare Reduction	57
Thickness without Liner	0.008 inches
Film Color	Neutral

2.3 SAFETY-AND-SECURITY FILM ACCESSORIES

- A. General: Provide accessories either manufactured by or acceptable to safety-and-security film manufacturer for application indicated, and with a proven record of compatibility with surfaces contacted in installation.
- B. Adhesive: Pressure sensitive adhesive which is activated by pressure and water. It is characterized by its permanently tacky nature and its installation ease. Protect adhesive from contamination by applying a release liner that will be removed and discarded at installation.
- C. Cleaners, Primers, and Sealers: Types recommended by safety-and-security film manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates for compliance with requirements and for conditions affecting performance of safety-and-security film including glass that is broken, chipped, cracked, abraded, or damaged in any way.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Comply with manufacturer's written instructions for surface preparation.
- B. Clean substrates thoroughly prior to installation.

- C. Prepare substrates using methods recommended by film manufacturer to achieve the best results for the substrate under project conditions.
- D. Protect window frames and surrounding surfaces to prevent damage during installation.

3.3 INSTALLATION

- A. Install in accordance with manufacturer's written instructions.
- B. Install with no gaps or overlaps.
- C. If seamed, make seams non-overlapping.
- D. Do not remove release liner from film until just before each piece of film is cut and ready for installation.
- E. Custom cut to the glass with neat, square corners and edges to within 1/8-inch of the window frame.
- F. Remove air bubbles, blisters, and other defects. Be careful to remove "fingers" to eliminate any contamination or excess water pockets. It is crucial to remove as much water as possible during installation.

3.4 FIELD QUALITY CONTROL

- A. 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, wrinkles, banding, thin spots or pinholes.
- B. If installed film does not meet these criteria, remove and replace with new film.

3.5 CLEANING AND PROTECTION

- A. Remove excess mounting solution at finished seams, perimeter edges, and adjacent surfaces.
- B. Use cleaning methods recommended by safety-and-security film manufacturer.
- C. Replace films that cannot be cleaned.
- D. Protect installed products until completion of project.
- E. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

EASTMAN



For inquiries inside the U.S. and Canada

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Advanced Materials - Performance Films
P.O. Box 5068
Martinsville, Virginia 24115
1-800-2LLUMAR
www.llumar.com

For inquiries outside the U.S. and Canada

Contact your regional technical services
representative or visit www.llumar.com.

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