

SOLAR CONTROL FILMS

LLumar[®] Safety/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) and Consumer Products Safety Commission (CPSC):
 - 1. ANSI Z97.1 / 16 CPSC CFR 1201 - Safety Glazing Materials Used in Buildings - Safety Performance Specifications and Methods of Test.
- B. ASTM International (ASTM):
 - 1. ASTM E84 - Test Method for Surface Burning Characteristics of Building Materials.
 - 2. ASTM E903 - Test Method for Solar Absorptance, Reflectance, and Transmittance of Materials Using Integrating Spheres.

1.5 DEFINITIONS

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

- B. 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 or 1/4-inch annealed glass, pass the impact test requirements of ANSI Z97.1 / CPSC 16 CFR 1201.
- B. Surface Burning Characteristics: Provide films that have a Class A rating when tested in accordance with ASTM E84 (Flame Spread 0-25, Smoke Developed Index 0-450).
- C. Projects for blast protection, windstorm or forced-entry protection contact: Eastman Performance Films Technical Enablement for proper specifications and test requirements. (276) 627 3234.
- D. Ultraviolet Transmission: Provide safety-and-security films with UV absorbing materials that limit the weighted UV Transmission to 1.0 percent or less when measured according to ASTM E903.
- E. 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 and/or selling safety-and-security films similar to be used for this project.
- B. **Installer Qualifications:** A firm that is authorized by safety-and-security film seller to install film in accordance with guidelines set forth by the seller.
- C. **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.
- D. **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 Commercial Building, Limited Warranty:** LLumar films 10 years; Vista by LLumar films 12 years. Certain restrictions apply.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. **Basis-of-Design Product:** The design is based on LLumar® Safety/Security Series Solar-Control Films sold by an Eastman Performance Films, LLC, 575 Maryville Centre Drive, St. Louis, Missouri 63141; Telephone: 800-851-7781; 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® SCL SR PS4 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	1.07
Shading Coefficient	0.98
% Ultraviolet Ray Protection (300nm-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	0.004 inches
Film Color	Clear

- B. Safety-and-Security Film: LLumar® SCL SR PS7 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	1.07
Shading Coefficient	0.97
% Ultraviolet Ray Protection (300nm-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	0.007 inches
Film Color	Clear

- C. Safety-and-Security Film: LLumar® SCL SR PS8 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	88
% Visible Light Reflection - Exterior	10
% Visible Light Reflection - Interior	10
Winter U-Value	1.06
Shading Coefficient	0.96
% Ultraviolet Ray Protection (300nm-380nm)	>99
Emissivity	0.90
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	-2
% Glare Reduction	2
Thickness without Liner	0.008 inches
Film Color	Clear

- D. Safety-and-Security Film: LLumar® SCL SR PS13 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	88
% Visible Light Reflection - Exterior	10
% Visible Light Reflection - Interior	10
Winter U-Value	1.06
Shading Coefficient	0.96
% Ultraviolet Ray Protection (300nm-380nm)	>99
Emissivity	0.90
Solar Heat Gain Coefficient	0.83
% Total Solar Energy Rejected	17
Light-to-Solar Heat Gain Ratio	1.06
% Summer Solar Heat Reduction	3
% Winter Heat Loss Reduction	-2
% Glare Reduction	2
Thickness without Liner	0.013 inches
Film Color	Clear

- E. Safety-and-Security Film: LLumar® DR15 SR PS5 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	14
% Total Solar Reflectance	40
% Total Solar Absorptance	46
% Visible Light Transmission	13
% Visible Light Reflection - Exterior	42

% Visible Light Reflection - Interior	12
Winter U-Value	0.91
Shading Coefficient	0.30
% Ultraviolet Ray Protection (300nm-380nm)	>99
Emissivity	0.60
Solar Heat Gain Coefficient	0.26
% Total Solar Energy Rejected	74
Light-to-Solar Heat Gain Ratio	0.50
% Summer Solar Heat Reduction	70
% Winter Heat Loss Reduction	13
% Glare Reduction	86
Thickness without Liner	0.005 inches
Film Color	Warm Gray

- F. Safety-and-Security Film: LLumar® DR15 SR PS9 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	14
% Total Solar Reflectance	40
% Total Solar Absorptance	46
% Visible Light Transmission	13
% Visible Light Reflection - Exterior	42
% Visible Light Reflection - Interior	13
Winter U-Value	0.91
Shading Coefficient	0.31
% Ultraviolet Ray Protection (300nm-380nm)	>99
Emissivity	0.62
Solar Heat Gain Coefficient	0.27
% Total Solar Energy Rejected	73
Light-to-Solar Heat Gain Ratio	0.48
% Summer Solar Heat Reduction	69
% Winter Heat Loss Reduction	13
% Glare Reduction	86
Thickness without Liner	0.009 inches
Film Color	Warm Gray

- G. Safety-and-Security Film: LLumar® DR25 SR PS5 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	18
% Total Solar Reflectance	35
% Total Solar Absorptance	47
% Visible Light Transmission	18
% Visible Light Reflection - Exterior	36
% Visible Light Reflection - Interior	14
Winter U-Value	0.90
Shading Coefficient	0.35
% Ultraviolet Ray Protection (300nm-380nm)	>99
Emissivity	0.59

Solar Heat Gain Coefficient	0.31
% Total Solar Energy Rejected	69
Light-to-Solar Heat Gain Ratio	0.58
% Summer Solar Heat Reduction	64
% Winter Heat Loss Reduction	13
% Glare Reduction	80
Thickness without Liner	0.005 inches
Film Color	Warm Gray

- H. Safety-and-Security Film: LLumar® DR25 SR PS9 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	18
% Total Solar Reflectance	35
% Total Solar Absorptance	47
% Visible Light Transmission	18
% Visible Light Reflection - Exterior	36
% Visible Light Reflection - Interior	14
Winter U-Value	0.90
Shading Coefficient	0.35
% Ultraviolet Ray Protection (300nm-380nm)	>99
Emissivity	0.59
Solar Heat Gain Coefficient	0.30
% Total Solar Energy Rejected	70
Light-to-Solar Heat Gain Ratio	0.60
% Summer Solar Heat Reduction	65
% Winter Heat Loss Reduction	13
% Glare Reduction	80
Thickness without Liner	0.009 inches
Film Color	Warm Gray

- I. Safety-and-Security Film: LLumar® R20 SR PS5 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	10
% Total Solar Reflectance	56
% Total Solar Absorptance	34
% Visible Light Transmission	13
% Visible Light Reflection - Exterior	62
% Visible Light Reflection - Interior	65
Winter U-Value	0.87
Shading Coefficient	0.21
% Ultraviolet Ray Protection (300nm-380nm)	>99
Emissivity	0.53
Solar Heat Gain Coefficient	0.19
% Total Solar Energy Rejected	81
Light-to-Solar Heat Gain Ratio	0.68
% Summer Solar Heat Reduction	78
% Winter Heat Loss Reduction	16

% Glare Reduction	86
Thickness without Liner	0.005 inches
Film Color	Silver

- J. Safety-and-Security Film: LLumar® R20 SR PS9 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	10
% Total Solar Reflectance	55
% Total Solar Absorptance	35
% Visible Light Transmission	13
% Visible Light Reflection - Exterior	61
% Visible Light Reflection - Interior	65
Winter U-Value	0.87
Shading Coefficient	0.22
% Ultraviolet Ray Protection (300nm-380nm)	>99
Emissivity	0.54
Solar Heat Gain Coefficient	0.19
% Total Solar Energy Rejected	81
Light-to-Solar Heat Gain Ratio	0.68
% Summer Solar Heat Reduction	78
% Winter Heat Loss Reduction	16
% Glare Reduction	86
Thickness without Liner	0.009 inches
Film Color	Silver

- K. Safety-and-Security Film: LLumar® N1020 SR PS4 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 Ray Protection (300nm-380nm)	>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

- L. Safety-and-Security Film: LLumar® N1020 SR PS8 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 Ray Protection (300nm-380nm)	>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

- M. Safety-and-Security Film: Vista™ by LLumar® Luminance V28 SR PS4 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	32
% Total Solar Absorptance	45
% Visible Light Transmission	29
% Visible Light Reflection - Exterior	32
% Visible Light Reflection - Interior	20
Winter U-Value	1.05
Shading Coefficient	0.43
% Ultraviolet Ray Protection (300nm-380nm)	>99
Emissivity	0.86
Solar Heat Gain Coefficient	0.37
% Total Solar Energy Rejected	63
Light-to-Solar Heat Gain Ratio	0.78
% Summer Solar Heat Reduction	57
% Winter Heat Loss Reduction	0
% Glare Reduction	68
Thickness without Liner	0.004 inches
Film Color	Blue Gray

- N. Safety-and-Security Film: Vista™ by LLumar® Luminance V28 SR PS8 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 Ray Protection (300nm-380nm)	>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	Blue Gray

- O. Safety-and-Security Film: Vista™ by LLumar® Mirage V38 SR PS8 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 Ray Protection (300nm-380nm)	>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	Blue Gray

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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For inquiries outside the U.S. and Canada

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

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