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

1. GENERAL
   * + 1. CONDITIONS AND REQUIREMENTS
          1. The General Conditions, Supplementary Conditions, and Division 01 – General Requirements apply.
       2. SECTION INCLUDES

Specifier Note: Delete items below that are not included in this section.

* + - * 1. Safety-and-security films
        2. [Insert item description.]
      1. RELATED SECTIONS

Specifier Note: In this article, specify work specified in other sections that is related to work of this section.

* + - * 1. Section 08 80 00 - Glazing: Substrate for application of safety-and-security film.

Specifier Note: The following paragraph is a sample that may be used in this article. Add to or delete from the following as appropriate for the specific project.

* + - * 1. Section [xxxxx] – [Section Title]: [Include brief description of work specified in another section that is related to the work of this section.]
      1. REFERENCES

Specifier Note: List standards referenced elsewhere in this section including designations and titles. Delete those standards not retained elsewhere in this section after editing.

* + - * 1. American National Standards Institute (ANSI) and Consumer Products Safety Commission (CPSC):

ANSI Z97.1 / 16 CPSC CFR 1201 - Safety Glazing Materials Used in Buildings - Safety Performance Specifications and Methods of Test.

* + - * 1. ASTM International (ASTM):

ASTM E84 - Test Method for Surface Burning Characteristics of Building Materials.

ASTM E903 - Test Method for Solar Absorptance, Reflectance, and Transmittance of Materials Using Integrating Spheres.

* + - 1. DEFINITIONS
         1. 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.
         2. Light to Solar Heat Gain Ratio: Ratio of visible light transmission to Solar Heat Gain Coefficient for a glazing system.
         3. 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 - TSER = SHGC.
      2. PERFORMANCE REQUIREMENTS
         1. 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.

Specifier Note: Select one (1) of the options in the following paragraph and delete the others. The first option is for SCL SR PS4 film; second option is for SCL SR PS6 film; third option is for SCL SR PS7 film; fourth option is for SCL SR PS8 film; fifth option is for SCL SR PS11 film; sixth option is for SCL SR PS15 film; seventh option is for R-20 SR PS4, N-1020 SR PS4, N-1040 SR PS4, N-1050 SR PS4, and NUV65 SR PS4 film; eighth option is for R-20 SR PS8, N-1020 SR PS8, N-1040 SR PS8, and N-1050 SR PS8 film.

* + - * 1. 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).
        2. Projects for blast protection, windstorm or forced-entry protection contact: Eastman Performance Films Technical Enablement for proper specifications and test requirements. (276) 627 3234.

Specifier Note: Select one (1) of the options in the following paragraph and delete the others. The first option is for SCL SR PS4, SCL SR PS7 film; second option is for SCL SR PS6, SCL SR PS8, SCL SR PS11, SCL SR PS15, N-1020 SR PS4, N-1020 SR PS8, N-1040 SR PS4, N-1040 SR PS8, N-1050 SR PS4, N-1050 SR PS8, R-20 SR PS4, and R-20 SR PS8 film; and third option is for NUV65 SR PS4 film.

* + - * 1. 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.
        2. Provide safety-and-security films that do not have a masking sheet.
      1. SUBMITTALS

Specifier Note: In this article, specify various types of data to be furnished by the contractor before, during, or after construction. Topics included in this article are: product data, shop drawings, samples, design data, test reports, certificates, manufacturers’ instructions, manufacturers’ field reports, qualification statements, and closeout submittals.

* + - * 1. Submit under provisions of Section [01 33 00] [\_\_\_\_\_\_].
        2. Product Data: Submit for each product specified indicating:

Performance properties.

Preparation and installation instructions and recommendations.

Storage and handling recommendations.

* + - * 1. Samples: For each type of safety-and-security film specified, two (2) samples, 12 inches square.
        2. Qualification Data: Submit documentation indicating qualifications of safety-and-security film manufacturer.
        3. Operation and Maintenance Data: Submit for safety-and-security control film to include in maintenance manuals.
        4. Warranty: Submit sample special warranty specified in this section.
      1. QUALITY ASSURANCE

Specifier Note: In this article, describe qualifications, regulatory requirements, certifications, field samples, mock-ups, and pre-installation meetings.

* + - * 1. 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.
        2. 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.
        3. Source Limitations: Obtain each type of safety-and-security film from same manufacturer.

Specifier Note: Retain the following paragraph and subparagraphs if the project requires one. Use mockups on large or complex projects.

* + - * 1. Mock-ups: Build mock-ups to verify selections made under sample submittals and to evaluate surface preparation techniques and application workmanship.

Construct mock-ups in the location and of the size indicated or, if not indicated, as directed by Architect.

Approved mock-ups may become part of the completed work if undisturbed at time of Substantial Completion.

* + - * 1. Pre-installation Conference: Conduct conference at project site to discuss methods and procedures relating to installation of the safety-and-security films.
      1. DELIVERY, STORAGE AND HANDLING
         1. Deliver, store and handle materials in manufacturer's protective packaging.
         2. Store and protect materials according to manufacturer's written recommendations to prevent damage from condensation, temperature changes, direct exposure to sun, or other causes.
      2. SITE CONDITIONS
         1. Ambient Conditions: Maintain temperature, humidity, and ventilation within limits recommended by manufacturer.
      3. LIMITED WARRANTY
         1. Manufacturer's Limited Warranty: Certain restrictions apply. The Manufacturer’s Limited Warranty can be viewed in full by [clicking here](http://cdn.llumar.com/drupal/20160617llvearchwarrantyl2096.pdf).

1. PRODUCTS
   * + 1. MANUFACTURERS
          1. Basis-of-Design Product: The design for spectrally-selective solar-control films is based on LLumar® Spectrally-Selective Series Solar-Control Films manufactured by an Eastman Performance Films, LLC, 575 Maryville Centre Drive, St. Louis, Missouri 63141; Telephone: 800-851-7781 (Option 2); <https://northamerica.llumar.com/contact-llumar>; Web Site: [www.llumar.com](http://www.llumar.com)..
          2. Representative: [Insert contact information.]

Specifier Note: Select either of the following two (2) paragraphs and delete the other.

* + - * 1. Substitutions will be considered, subject to compliance with requirements of this section, under provisions of Section 01 60 00.
      1. SAFETY-AND-SECURITY FILMS

Specifier Note: Select any of the following four (4) paragraphs and delete the others. If retaining more than one (1) type indicate locations on Drawings or add a schedule at the end of this section.

* + - * 1. Safety-and-Security Film: LLumar® SCL SR PS2 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 (300nm-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 |

* + - * 1. 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 |

* + - * 1. 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 |

* + - * 1. 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 |

* + - * 1. 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 |

* + - * 1. 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 |

* + - * 1. 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 |

* + - * 1. 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 |

* + - * 1. 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 |

* + - * 1. 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 |

* + - * 1. 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 |

* + - * 1. 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 |

* + - * 1. 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 |

* + - * 1. Safety-and-Security Film: LLumar® N1040 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 | 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 Ray Protection (300nm-380nm) | >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 |

* + - * 1. Safety-and-Security Film: LLumar® N1040 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 | 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 Ray Protection (300nm-380nm) | >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 |

* + - * 1. Safety-and-Security Film: LLumar® N1050 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 | 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 Ray Protection (300nm-380nm) | >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 |

* + - * 1. Safety-and-Security Film: LLumar® N1050 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 | 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 Ray Protection (300nm-380nm) | >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 |

* + - * 1. 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 |

* + - * 1. 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 |

* + - * 1. 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 |

* + - 1. SAFETY-AND-SECURITY FILM ACCESSORIES
         1. 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.
         2. 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.
         3. Cleaners, Primers, and Sealers: Types recommended by safety-and-security film manufacturer.

1. EXECUTION
   * + 1. EXAMINATION
          1. 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.
          2. Proceed with installation only after unsatisfactory conditions have been corrected.
       2. PREPARATION
          1. Comply with manufacturer’s written instructions for surface preparation.
          2. Clean substrates thoroughly prior to installation.
          3. Prepare substrates using methods recommended by film manufacturer to achieve the best results for the substrate under project conditions.
          4. Protect window frames and surrounding surfaces to prevent damage during installation.
       3. INSTALLATION
          1. Install in accordance with manufacturer’s written instructions.
          2. Install with no gaps or overlaps.
          3. If seamed, make seams non-overlapping.
          4. Do not remove release liner from film until just before each piece of film is cut and ready for installation.
          5. Custom cut to the glass with neat, square corners and edges to within 1/8-inch of the window frame.
          6. 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.
       4. FIELD QUALITY CONTROL
          1. 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.
          2. If installed film does not meet these criteria, remove and replace with new film.
       5. CLEANING AND PROTECTION
          1. Remove excess mounting solution at finished seams, perimeter edges, and adjacent surfaces.
          2. Use cleaning methods recommended by safety-and-security film manufacturer.
          3. Replace films that cannot be cleaned.
          4. Protect installed products until completion of project.
          5. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

**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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