

LLumar® Dual-Reflective 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. Solar-control films.
- B. [Insert item description.]

1.3 RELATED SECTIONS

- A. Section 08 80 00 - Glazing: Substrate for application of solar-control 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. ASTM International (ASTM):
 - 1. ASTM E903 - Test Method for Solar Absorptance, Reflectance, and Transmittance of Materials Using Integrating Spheres.

1.5 DEFINITIONS

- A. Dual-Reflective Solar-Control Films: Film products where interior visible light reflectance is less than exterior visible light reflectance. Lower interior reflectance provides improved visibility from interior to exterior without affecting the film's solar performance.

1.6 PERFORMANCE REQUIREMENTS

- A. Dual-reflective solar-control film products shall help improve solar heat and UV reduction, glare reduction, privacy, fade protection, and aesthetic characteristics when applied to glass surfaces.
- B. Ultraviolet Transmission: Provide solar-control films with UV absorbing materials that limit the weighted UV Transmission to one (1) percent or less when measured according to ASTM E903.
- C. Provide solar-control 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 solar-control film specified, two (2) samples, 12 inches square.
- D. Qualification Data: Submit documentation indicating qualifications of solar-control film manufacturer.
- E. Operation and Maintenance Data: Submit for solar-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 solar-control films similar to be used for this project.
- B. Installer Qualifications: A firm that is authorized by solar-control film manufacturer to install film in accordance with guidelines set forth by the manufacturer.
- C. Source Limitations: Obtain each type of solar-control 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 solar-control 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 dual-reflective solar-control films is based on LLumar® Dual-Reflective 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.
- 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 SOLAR-CONTROL FILMS

- A. Solar-Control Film: LLumar® Dual-Reflective DR05SRCDF Film with the following performance characteristics when applied to the interior surface of single-pane, 1/4-inch clear glass:

% Total Solar Transmittance	6
% Total Solar Reflectance	50
% Total Solar Absorptance	44
% Visible Light Transmission	6
% Visible Light Reflection - Exterior	59
% Visible Light Reflection - Interior	16
Winter U-Value	0.87
Shading Coefficient	0.20
% Ultraviolet Ray Protection (300nm-380nm)	>99
Emissivity	0.56
Solar Heat Gain Coefficient	0.17
% Total Solar Energy Rejection	83
Light-to-Solar Heat Gain Ratio	0.35
% Summer Solar Heat Reduction	79
% Winter Heat Loss Reduction	16
% Glare Reduction	93
Thickness without Liner	43 μ
Film Color	Warm Gray

- B. Solar-control Film: LLumar® Dual-reflective DR15SRCDF Film with the following performance characteristics when applied to the interior surface of single-pane, 1/4-inch clear glass:

% Total Solar Transmittance	15
% Total Solar Reflectance	34
% Total Solar Absorptance	51
% Visible Light Transmission	16
% Visible Light Reflection - Exterior	38
% Visible Light Reflection - Interior	13
Winter U-Value	0.91
Shading Coefficient	0.33
% Ultraviolet Ray Protection (300nm-380nm)	>99
Emissivity	0.62
Solar Heat Gain Coefficient	0.29

% Total Solar Energy Rejection	71
Light-to-Solar Heat Gain Ratio	0.55
% Summer Solar Heat Reduction	65
% Winter Heat Loss Reduction	12
% Glare Reduction	82
Thickness without Liner	43 μ
Film Color	Warm Gray

- C. Solar-control Film: LLumar® Dual-reflective DRN25SRCDF Film with the following performance characteristics when applied to the interior surface of single-pane, 1/4-inch clear glass:

% Total Solar Transmittance	21
% Total Solar Reflectance	27
% Total Solar Absorptance	52
% Visible Light Transmission	22
% Visible Light Reflection - Exterior	29
% Visible Light Reflection - Interior	12
Winter U-Value	0.91
Shading Coefficient	0.41
% Ultraviolet Ray Protection (300nm-380nm)	>99
Emissivity	0.62
Solar Heat Gain Coefficient	0.35
% Total Solar Energy Rejected	65
Light-to-Solar Heat Gain Ratio	0.63
% Summer Solar Heat Reduction	57
% Winter Heat Loss Reduction	12
% Glare Reduction	75
Thickness without Liner	43 μ
Film Color	Warm Gray

- D. Solar-control Film: LLumar® Dual-reflective DRN35SRCDF Film with the following performance characteristics when applied to the interior surface of single-pane, 1/4-inch clear glass:

% Total Solar Transmittance	30
% Total Solar Reflectance	20
% Total Solar Absorptance	50
% Visible Light Transmission	34
% Visible Light Reflection - Exterior	20
% Visible Light Reflection - Interior	13
Winter U-Value	0.94
Shading Coefficient	0.50
% Ultraviolet Ray Protection (300nm-380nm)	>99
Emissivity	0.67
Solar Heat Gain Coefficient	0.44
% Total Solar Energy Rejected	56
Light-to-Solar Heat Gain Ratio	0.77
% Summer Solar Heat Reduction	46
% Winter Heat Loss Reduction	9
% Glare Reduction	61
Thickness without Liner	43 μ
Film Color	Warm Gray

- E. Solar-control Film: Vista™ by LLumar® Dual-reflective Series Ultima V14SRCDF Film with the following performance characteristics when applied to the interior surface of single-pane, 1/4-inch clear glass:

% Total Solar Transmittance	7
% Total Solar Reflectance	44
% Total Solar Absorptance	49
% Visible Light Transmission	10
% Visible Light Reflection - Exterior	53
% Visible Light Reflection - Interior	24
Winter U-Value	1.01
Shading Coefficient	0.25
% Ultraviolet Ray Protection (300nm-380nm)	>99
Emissivity	0.80
Solar Heat Gain Coefficient	0.22
% Total Solar Energy Rejected	78
Light-to-Solar Heat Gain Ratio	0.45
% Summer Solar Heat Reduction	73
% Winter Heat Loss Reduction	2
% Glare Reduction	89
Thickness without Liner	43 μ
Film Color	Blue Gay

- F. Solar-control Film: Vista™ by LLumar® Dual-reflective Series Celeste V18SRCDF Film with the following performance characteristics when applied to the interior surface of single-pane, 1/4-inch clear glass:

% Total Solar Transmittance	14
% Total Solar Reflectance	34
% Total Solar Absorptance	52
% Visible Light Transmission	20
% Visible Light Reflection - Exterior	39
% Visible Light Reflection - Interior	21
Winter U-Value	1.01
Shading Coefficient	0.34
% Ultraviolet Ray Protection (300nm-380nm)	>99
Emissivity	0.80
Solar Heat Gain Coefficient	0.30
% Total Solar Energy Rejected	70
Light-to-Solar Heat Gain Ratio	0.67
% Summer Solar Heat Reduction	63
% Winter Heat Loss Reduction	2
% Glare Reduction	77
Thickness without Liner	43 μ
Film Color	Blue Gray

- G. Solar-control Film: Vista™ by LLumar® Dual-reflective Series Luminance V28SRCDF Control Film with the following performance characteristics when applied to the interior surface of single-pane, 1/4-inch clear glass:

% Total Solar Transmittance	22
% Total Solar Reflectance	28
% Total Solar Absorptance	50
% Visible Light Transmission	30
% Visible Light Reflection - Exterior	32
% Visible Light Reflection - Interior	22
Winter U-Value	0.99
Shading Coefficient	0.42
% Ultraviolet Ray Protection (300nm-380nm)	>99
Emissivity	0.77
Solar Heat Gain Coefficient	0.37
% Total Solar Energy Rejected	63
Light-to-Solar Heat Gain Ratio	0.81
% Summer Solar Heat Reduction	55
% Winter Heat Loss Reduction	4
% Glare Reduction	66
Thickness without Liner	43 μ
Film Color	Blue Gray

- H. Solar-control Film: Vista™ by LLumar® Dual-reflective Series Mirage V38SRCDF Film with the following performance characteristics when applied to the interior surface of single-pane, 1/4-inch clear glass:

% Total Solar Transmittance	28
% Total Solar Reflectance	23
% Total Solar Absorptance	49
% Visible Light Transmission	38
% Visible Light Reflection - Exterior	25
% Visible Light Reflection - Interior	17
Winter U-Value	1.01
Shading Coefficient	0.50
% Ultraviolet Ray Protection (300nm-380nm)	>99
Emissivity	0.78
Solar Heat Gain Coefficient	0.43
% Total Solar Energy Rejected	57
Light-to-Solar Heat Gain Ratio	0.88
% Summer Solar Heat Reduction	48
% Winter Heat Loss Reduction	2
% Glare Reduction	57
Thickness without Liner	43 μ
Film Color	Blue Gray

- I. Solar-control Film: Vista™ by LLumar® Dual-reflective Series Nuance V48SRCDF Film with the following performance characteristics when applied to the interior surface of single-pane, 1/4-inch clear glass:

% Total Solar Transmittance	36
% Total Solar Reflectance	14
% Total Solar Absorptance	50
% Visible Light Transmission	46
% Visible Light Reflection - Exterior	15
% Visible Light Reflection - Interior	11
Winter U-Value	1.02
Shading Coefficient	0.59
% Ultraviolet Ray Protection (300nm-380nm)	>99
Emissivity	0.84
Solar Heat Gain Coefficient	0.52
% Total Solar Energy Rejected	48
Light-to-Solar Heat Gain Ratio	0.88
% Summer Solar Heat Reduction	37
% Winter Heat Loss Reduction	1
% Glare Reduction	48
Thickness without Liner	43 μ
Film Color	Blue Gray

- J. Solar-control Film: Vista™ by LLumar® Dual-reflective Series Sunrise Bronze V33BR SRCDF Film with the following performance characteristics when applied to the interior surface of single-pane, 1/4-inch clear glass:

% Total Solar Transmittance	23
% Total Solar Reflectance	36
% Total Solar Absorptance	41
% Visible Light Transmission	38
% Visible Light Reflection - Exterior	24
% Visible Light Reflection - Interior	18
Winter U-Value	0.94
Shading Coefficient	0.40
% Ultraviolet Ray Protection (300nm-380nm)	>99
Emissivity	0.67
Solar Heat Gain Coefficient	0.35
% Total Solar Energy Rejected	65
Light-to-Solar Heat Gain Ratio	1.09
% Summer Solar Heat Reduction	57
% Winter Heat Loss Reduction	9
% Glare Reduction	57
Thickness without Liner	43 μ
Film Color	Bronze

2.3 SOLAR-CONTROL FILM ACCESSORIES

- K. General: Provide accessories either manufactured by or acceptable to solar-control film manufacturer for application indicated, and with a proven record of compatibility with surfaces contacted in installation.

- L. Adhesive: Films with CDF designation utilize a water- activated, dry-adhesive system that forms a molecular bond between the film and glass. Films with a PS designation utilize a 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.
- M. Cleaners, Primers, and Sealers: Types recommended by solar-control film manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates for compliance with requirements and for conditions affecting performance of solar-control 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. Clean substrates thoroughly prior to installation. Provide additional scrubbing of perimeter area with X-100® solution.
- B. Prepare substrates using methods recommended by film manufacturer to achieve the best results for the substrate under project conditions.
- C. 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. Use X-100® solution for the application for films designated with CDF adhesive, unless otherwise recommended by the manufacturer. For Safety Solar-Control Films designated with PS adhesive, use Film-On for application.
- 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 solar-control 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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