SECTION 08 87 13

SOLAR CONTROL FILM

\*\* NOTE TO SPECIFIER \*\* Solar Gard®; Armorcoat and Panorama Safety and Security Films.
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This section is based on the products of Solar Gard®, which is located at:
4540 Viewridge Ave
San Diego, CA 92123.
Toll Free: (866) 572-1922.
Tel: (858) 576-0200.
Email:info@solargard.com
Web:[www.solargard.com](http://www.solargard.com)
[[Click Here](http://www.arcat.com/arcatcos/cos41/arc41218.html)] for additional information.

Saint-Gobain Solar Gard, an industry expert in film and coating solutions for more than 40 years manufacturing high quality films composed of incredibly strong, optically clear, high quality polyester, high-grade ultraviolet inhibitors and special laminating and mounting adhesives, with a protective, scratch-resistant coating.

Solar Gard solar control window films are designed to offer the best experience in terms of comfort, energy savings, and aesthetics. Solar Control films can reject up to 86% of the sun’s total solar energy to improve occupant comfort, reduce energy consumption, and improve exterior aesthetics. Both clear and solar safety versions block 99% of the sun’s destructive ultraviolet rays to provide protection from premature fading and deterioration of furnishings.

Solar Gard Armorcoat® Safety & Security Films have been securing buildings around the world for decades, including some of the most prominent government facilities in the U.S. [Solar Gard](https://www.solargard.com/uk/whysolargard/) Armorcoat has been rigorously tested to globally recognized standards, including ISO, GSA and ASTM. Globally, schools have also benefited from the added layer of protection safety film provides.

Saint-Gobain Solar Gard is the first window film manufacturer to measure the net carbon impact of its architectural solar control window films and achieve a Climate Declaration. A complete Life Cycle Analysis was conducted on its Solar Gard and Panorama solar control films, providing evidence on how these films produce a net reduction in greenhouse gas emissions.

1. GENERAL
	1. SECTION INCLUDES
2. Solar control film applied to existing glass.
	1. REFERENCES

\*\* NOTE TO SPECIFIER \*\* Delete references from the list below that are not actually required by the text of the edited section.

1. LBNL WINDOW SOFTWARE - A computer program for calculating total window thermal performance indices (i.e. U-values, solar heat gain coefficients, and visible transmittances).
2. NFRC 100/200 - Standard Methods of Test for Solar Absorbance, Reflectance and Transmittance of Materials Using Integrating Spheres.
3. ASTM E 903 - Standard Methods of Test for Solar Absorbance, Reflectance and Transmittance of Materials Using Integrating Spheres.
4. ASTM E 84 - Standard Method of Test for Surface Burning Characteristics of Building Materials.
	1. PERFORMANCE REQUIREMENTS

\*\* NOTE TO SPECIFIER \*\* Delete performance requirements from the list below not required for project.

* + 1. Flammability: Meets surface burning characteristics in accordance with ASTM E-84 Class A
			1. Flame Spread Index = < 25
			2. Smoke Development Index = < 450
		2. Volatile Organic Compound Content:
			1. Compliant with the performance standard established for low-emitting materials under the CDPH, the Collaborative for High Performance Schools (CHPS) and the LEED v4 programs.
	1. SUBMITTALS

\*\* NOTE TO SPECIFIER \*\* Delete submittals not required for the project.

* + 1. Submit under provisions of Section 01 30 00.
		2. Product Data: Manufacturer's data sheets on each product to be used, including:
			1. Physical properties and independent testing agency reports showing compliance with specified tests.
			2. Preparation instructions and recommendations.
			3. Storage and handling requirements and recommendations.
			4. Installation methods.
		3. Provide a Film to Glass Stress Analysis of the existing glass and proposed glass/solar film combination as recommended by the film manufacturer.
		4. Provide energy saving simulations report using Efilm energy analyzing software application to determine available energy cost reduction and savings.
		5. Shop Drawings: Detailing installation of film, anchoring accessories, and/or sealant.
		6. Verification Samples: For each finish product specified, two samples, minimum size 6 inches (150 mm) square, representing the actual product, color, and patterns.
		7. Manufacturer's Certificates: Certify products meet or exceed specified requirements.
		8. Manufacturer's warranty information.
	1. QUALITY ASSURANCE
		1. Manufacturer Qualifications: Products specified shall be a standard product of a manufacturer regularly engaged in the manufacturing and distribution of such products for a minimum of 10 years.
			1. Provide a Quality Management certificate stating the manufacturing facility’s location conformance with ISO 9001
			2. Provide an Environmental Management certificate stating the manufacturing facility’s location conformance with ISO 14001
		2. Installer Qualifications: Documented experience in the application of self-adhesive window films with at least 3 applications of similar size and complexity, and approved by the solar film manufacturer.

\*\* NOTE TO SPECIFIER \*\* Include a mock-up if the project size and/or quality warrant taking such a precaution. The following is one example of how a mock-up on a large project might be specified. When deciding on the extent of the mock-up, consider all the major different types of work on the project.

* + 1. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.
			1. Apply film to one window designated by Architect.
			2. Do not proceed with remaining work until workmanship and color, is approved by Architect.
	1. DELIVERY, STORAGE, AND HANDLING
		1. Store products indoors in manufacturer's unopened packaging until ready for installation.
	2. PROJECT CONDITIONS
		1. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.
	3. WARRANTY

\*\* NOTE TO SPECIFIER \*\* Delete the following paragraphs if no warranties are required or if the work is covered under the terms of a general project warranty specified elsewhere.

* + 1. See Section 01 78 23 - Preventative Maintenance Instructions.
		2. Provide film manufacturer's limited warranty against failure of film, including change of color, peeling, bubbling, rippling, cracking, delamination and demetallization; includes cost of material and labor for removal and reinstallation. Duration of warranty shall be as follows:
			1. Twelve (12) Year Limited Warranty for the following solar control film products:
				1. Solar Gard Sterling Solar Control Window Film
1. PRODUCTS
	1. MANUFACTURERS
		1. Acceptable Manufacturer: Solar Gard®, which is located at: 4540 View Ridge Ave. ; San Diego, CA 92123; Toll Free Tel: 866-572-1922; Tel: 858-576-0200; Email:info@solargard.com; Web:[www.solargard.com](http://www.solargard.com)
		2. Requests for substitutions will be considered in accordance with provisions of Section 01 60 00.
	2. SOLAR CONTROL FILM

\*\* NOTE TO SPECIFIER \*\* Delete film options from the list below not considered for project.

* + 1. Solar Gard Sterling 70 solar control film shall have the following nominal properties when applied to 1/4 inch (6 mm) clear glass with pressure sensitive adhesive calculated using NFRC methodology and LBNL Window software.
			1. Film Performance Results, Nominal
				1. Film Color: Clear
				2. Visible Light Transmittance: 74 percent
				3. Visible Light Reflectance: (Exterior) 13 percent
				4. Visible Light Reflectance: (Interior) 12 percent
				5. Total Solar Energy Rejected: 36 percent
				6. Solar Heat Gain Coefficient: .64
				7. U-Factor Btu/h-ft² F (Winter): 1.00
				8. Solar Transmittance: 55 percent
				9. Solar Absorptance: 31 percent
				10. Solar Reflectance: 14 percent
				11. Ultraviolet Light Blocked (300-380 nanometers): > 99 percent
				12. UV Tdw-ISO @ 300 to 700 nm: 52 percent
			2. Film Performance Results when applied to 1/4 inch (6 mm) clear insulated glass (Nominal)
				1. Film color: Clear
				2. Visible Light Transmittance: 66 percent
				3. Visible Light Reflectance: (Exterior) 18 percent
				4. Visible Light Reflectance: (Interior) 17 percent
				5. Total Solar Energy Rejected: 39 percent
				6. Solar Heat Gain Coefficient: .61
				7. U-Factor Btu/h-ft² F (Winter): .47
				8. Solar Transmittance: 44 percent
				9. Solar Absorptance: 40 percent
				10. Solar Reflectance: 16 percent
				11. Ultraviolet Light Blocked (300-380 nanometers): > 99 percent
				12. UV Tdw-ISO @ 300 to 700 nm: 46 percent
		2. Solar Gard Sterling 60 solar control film shall have the following nominal properties when applied to 1/4 inch (6 mm) clear glass with pressure sensitive adhesive calculated using NFRC methodology and LBNL Window software.
			1. Film Performance Results, Nominal
				1. Film Color: Clear
				2. Visible Light Transmittance: 63 percent
				3. Visible Light Reflectance: (Exterior) 17 percent
				4. Visible Light Reflectance: (Interior) 16 percent
				5. Total Solar Energy Rejected: 44 percent
				6. Solar Heat Gain Coefficient: .56
				7. U-Factor Btu/h-ft² F (Winter): .98
				8. Solar Transmittance: 45 percent
				9. Solar Absorptance: 36 percent
				10. Solar Reflectance: 19 percent
				11. Ultraviolet Light Blocked (300-380 nanometers): > 99 percent
				12. UV Tdw-ISO @ 300 to 700 nm: 45 percent
			2. Film Performance Results when applied to 1/4 inch (6 mm) clear insulated glass (Nominal)
				1. Film color: Clear
				2. Visible Light Transmittance: 57 percent
				3. Visible Light Reflectance: (Exterior) 22 percent
				4. Visible Light Reflectance: (Interior) 20 percent
				5. Total Solar Energy Rejected: 44 percent
				6. Solar Heat Gain Coefficient: .56
				7. U-Factor Btu/h-ft² F (Winter): .46
				8. Solar Transmittance: 36 percent
				9. Solar Absorptance: 45 percent
				10. Solar Reflectance: 19 percent
				11. Ultraviolet Light Blocked (300-380 nanometers): > 99 percent
				12. UV Tdw-ISO @ 300 to 700 nm: 40 percent
		3. Solar Gard Sterling 50 solar control film shall have the following nominal properties when applied to 1/4 inch (6 mm) clear glass with pressure sensitive adhesive calculated using NFRC methodology and LBNL Window software.
			1. Film Performance Results, Nominal
				1. Film Color: Silver
				2. Visible Light Transmittance: 49 percent
				3. Visible Light Reflectance: (Exterior) 25 percent
				4. Visible Light Reflectance: (Interior) 24 percent
				5. Total Solar Energy Rejected: 56 percent
				6. Solar Heat Gain Coefficient: .44
				7. U-Factor Btu/h-ft² F (Winter): .95
				8. Solar Transmittance: 33 percent
				9. Solar Absorptance: 39 percent
				10. Solar Reflectance: 28 percent
				11. Ultraviolet Light Blocked (300-380 nanometers): > 99 percent
				12. UV Tdw-ISO @ 300 to 700 nm: 37 percent
			2. Film Performance Results when applied to 1/4 inch (6 mm) clear insulated glass (Nominal)
				1. Film color: Silver
				2. Visible Light Transmittance: 44 percent
				3. Visible Light Reflectance: (Exterior) 29 percent
				4. Visible Light Reflectance: (Interior) 26 percent
				5. Total Solar Energy Rejected: 52 percent
				6. Solar Heat Gain Coefficient: .48
				7. U-Factor Btu/h-ft² F (Winter): .45
				8. Solar Transmittance: 27 percent
				9. Solar Absorptance: 49 percent
				10. Solar Reflectance: 24 percent
				11. Ultraviolet Light Blocked (300-380 nanometers): > 99 percent
				12. UV Tdw-ISO @ 300 to 700 nm: 34 percent
		4. Solar Gard Sterling 40 solar control film shall have the following nominal properties when applied to 1/4 inch (6 mm) clear glass with pressure sensitive adhesive calculated using NFRC methodology and LBNL Window software.
			1. Film Performance Results, Nominal
				1. Film Color: Silver
				2. Visible Light Transmittance: 41 percent
				3. Visible Light Reflectance: (Exterior) 32 percent
				4. Visible Light Reflectance: (Interior) 30 percent
				5. Total Solar Energy Rejected: 62 percent
				6. Solar Heat Gain Coefficient: .38
				7. U-Factor Btu/h-ft² F (Winter): .94
				8. Solar Transmittance: 26 percent
				9. Solar Absorptance: 41 percent
				10. Solar Reflectance: 33 percent
				11. Ultraviolet Light Blocked (300-380 nanometers): > 99 percent
				12. UV Tdw-ISO @ 300 to 700 nm: 32 percent
			2. Film Performance Results when applied to 1/4 inch (6 mm) clear insulated glass (Nominal)
				1. Film color: Silver
				2. Visible Light Transmittance: 37 percent
				3. Visible Light Reflectance: (Exterior) 34 percent
				4. Visible Light Reflectance: (Interior) 31 percent
				5. Total Solar Energy Rejected: 56 percent
				6. Solar Heat Gain Coefficient: .44
				7. U-Factor Btu/h-ft² F (Winter): .45
				8. Solar Transmittance: 22 percent
				9. Solar Absorptance: 50 percent
				10. Solar Reflectance: 28 percent
				11. Ultraviolet Light Blocked (300-380 nanometers): > 99 percent
				12. UV Tdw-ISO @ 300 to 700 nm: 29 percent
		5. Solar Gard Sterling 20 solar control film shall have the following nominal properties when applied to 1/4 inch (6 mm) clear glass with pressure sensitive adhesive calculated using NFRC methodology and LBNL Window software.
			1. Film Performance Results, Nominal
				1. Film Color: Silver
				2. Visible Light Transmittance: 22 percent
				3. Visible Light Reflectance: (Exterior) 44 percent
				4. Visible Light Reflectance: (Interior) 42 percent
				5. Total Solar Energy Rejected: 74 percent
				6. Solar Heat Gain Coefficient: .26
				7. U-Factor Btu/h-ft² F (Winter): .94
				8. Solar Transmittance: 14 percent
				9. Solar Absorptance: 44 percent
				10. Solar Reflectance: 12 percent
				11. Ultraviolet Light Blocked (300-380 nanometers): > 99 percent
				12. UV Tdw-ISO @ 300 to 700 nm: 18 percent
			2. Film Performance Results when applied to 1/4 inch (6 mm) clear insulated glass (Nominal)
				1. Film color: Silver
				2. Visible Light Transmittance: 21 percent
				3. Visible Light Reflectance: (Exterior) 45 percent
				4. Visible Light Reflectance: (Interior) 43 percent
				5. Total Solar Energy Rejected: 64 percent
				6. Solar Heat Gain Coefficient: .36
				7. U-Factor Btu/h-ft² F (Winter): .45
				8. Solar Transmittance: 12 percent
				9. Solar Absorptance: 55 percent
				10. Solar Reflectance: 13 percent
				11. Ultraviolet Light Blocked (300-380 nanometers): > 99 percent
				12. UV Tdw-ISO @ 300 to 700 nm: 17 percent
		6. Physical Properties, Nominal
			1. NA
1. EXECUTION
	1. EXAMINATION
		1. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
		2. Glass surfaces should be inspected for defects including scratches or defects which will affect the final appearance.
		3. Do not begin installation until substrates have been properly inspected.
	2. PREPARATION
		1. Clean surfaces thoroughly prior to installation.
		2. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
	3. INSTALLATION
		1. Install in accordance with manufacturer's instructions. Installation must be accomplished by a recognized professional installer of film for energy control purposes or safety and security purposes. Completed work must meet IWFA visual acceptance standard.
		2. Install without bubbles, ripples, drips, dirt, cuts, tears or gaps between film and frame.
		3. Clean newly installed film and window frames after installation.
		4. Clean up cleaning solutions, run-off cleaning water and adhesive mounting solution.
	4. PROTECTION
		1. Protect installed products until completion of project.
		2. Where installed film could be damaged by subsequent construction provide tape warning strips or barricades to prevent contact.

END OF SECTION