

Recommendations for Possible Use of



in the U. S. Green Building Council

Leadership in Energy and Environmental Design Green Building Rating System™

(Specifically, 2009 New Construction and Renovation and 2009 Commercial Interiors)

The intent of this document is to address areas of the U.S. Green Building Council's Leadership in Energy & Environmental Design (LEED®) Rating System that could be relevant to the use of Dreamwalls® Color Glass back-painted glass. Although individual building products do not in themselves constitute conformance to the LEED® criteria, depending on the amount and type of glass used in a project, this versatile material has great potential to help achieve LEED® credits.

Although back-painted glass can be used on a project in many forms, it is critical that products conform to recognized standards to ensure the integrity of the building or space.

Applicable Standards: The standards listed below are the most applicable to the various silvered glass products contained in this document; however, this is not an exhaustive list. For the complete directory of ASTM Standards, visit www.astm.org.

- Flat glass products to comply with ASTM C 1036 *Standard Specification for Flat Glass*
- Glass coated with organic coatings (of which Dreamwalls® Color Glass is) to comply with:
 - ASTM D 3359 *Standard Test Methods for Measuring Adhesion by Tape Test*
- Laminated glass products to comply with:
 - ASTM C 1172 *Standard Specification for Laminated Architectural Flat Glass*
 - ANSI Z97.1-2004 *American National Standards Institute (ANSI) American National Standard for Safety Glazing Materials Used in Buildings – Safety Performance Specifications and Methods of Test*
 - CAN/CGSB -12.1-M90 Canadian General Standards Board (CGSB) *Tempered or Laminated Safety Glass*
 - 16CFR1201, Category II U.S. Government Code of Federal Regulations Part 1201 - *Safety Standard for Architectural Glazing Materials*

NOTE: This document is intended to provide general information only. Gardner Glass Products, Inc. does not make any warranty, either expressly or implied, as to the suitability or completeness of the information contained herein. Dreamwalls® Color Glass is available in a variety of fabricated forms, such as tempered, laminated, acid-etched, safety backed, or with various types of edgework.



LEED® Category: Energy and Atmosphere

Credit: EA Credit 1: Optimize Energy Performance

LEED® Credit Range: 1–19 points (NC & Schools), 3 – 21 points (CS)

Intent: To achieve increasing levels of energy performance beyond the prerequisite standard to reduce environmental and economic impacts associated with excessive energy use.

Requirements: Select one of the three compliance path options described below. Project teams documenting achievement using any of the three options are assumed to be in compliance with EA Prerequisite 2: Minimum Energy Performance.

Option 1 – Whole Energy Building Simulation (1–19 points for NC & Schools, 3 – 21 points for CS)

Demonstrate a percentage improvement in the proposed building performance rating compared with the baseline building performance rating. Calculate the baseline building performance according to Appendix G of ANSI/ ASHRAE/IESNA Standard 90.1-2007 (with errata but without addenda) using a computer simulation model for the whole building project. Points are awarded for New Buildings, Existing Building Renovations, NC & Schools and Core & Shell as outlined in the table in the Reference Guide. All other credit criteria and compliance measures for this credit are described in detail in the LEED® Reference Guide for Green Building Design and Construction, 2009 Edition.

Option 2 – Prescriptive Compliance Path: ASHRAE Advanced Energy Design Guide (1 point)

Comply with the prescriptive measures of the ASHRAE Advanced Energy Design Guide appropriate to the project scope, outlined in the LEED® Reference Guide for Green Building Design and Construction, 2009 Edition. Project teams must comply with all applicable criteria as established in the Advanced Energy Design Guide for the climate zone in which the building is located.

PATH 1. ASHRAE Advanced Energy Design Guide for Small Office Buildings 2004

The building must meet the following requirements:

- Less than 20,000 sq ft
- Office occupancy

PATH 2. ASHRAE Advanced Energy Design Guide for Small Retail Buildings 2006

The building must meet the following requirements:

- Less than 20,000 sq ft
- Retail occupancy

PATH 3. ASHRAE Advanced Energy Design Guide for Small Warehouses and Self Storage Buildings 2008



The building must meet the following requirements:

- Less than 50,000 sq ft
- Warehouse or self-storage occupancy

Schools. Option 2. Prescriptive Compliance Path: Advanced Energy Design Guide for K–12 School Buildings (1 point)

Comply with all the prescriptive measures identified in the Advanced Energy Design Guide for K–12 School buildings.

- Projects using Option 2 must be less than 200,000 square feet.

Option 3 – Prescriptive Compliance Path: Advanced Buildings™ Core Performance™ Guide (1–3 points)

Comply with the prescriptive measures identified in the Advanced Buildings™ Core Performance™ Guide developed by the New Buildings Institute. The building must meet the following requirements:

- Less than 100,000 sq ft
- Comply with Section 1: Design Process Strategies, and Section 2: Core Performance Requirements
- Health care, warehouse or laboratory projects are ineligible for the path (for NC & CS Projects)

Points achieved under Option 3 (1 point):

- 1 point is available for all projects (office, school, public assembly and retail projects) less than 100,000 sq ft that comply with Sections 1 and 2 of the Core Performance Guide
- Up to 2 additional points are available to projects that implement performance strategies listed in Section 3: Enhanced Performance. For every 3 strategies implemented from this section, 1 point is available
- The following strategies are addressed by other aspects of LEED® and are not eligible for additional points under EA Credit 1:
 - 3.1 – Cool Roofs
 - 3.8 – Night Venting
 - 3.13 – Additional Commissioning

Exemplary Performance: Option 1. Projects that use Option 1 and demonstrate a percentage improvement in the proposed building performance rating compared with the baseline building performance rating per ASHRAE 90.1-2007 by the following minimum energy cost savings percentages will be considered for 1 additional point under the Innovation in Design category:

- New buildings: 50%
- Existing Building Renovation: 46%

Options 2 & 3 – Not available under the Innovation in Design category.

USGBC LEED®–CI Variation: EQ Credit 1 is split into categories as follows:

EQ Credit 1.1: Optimize Energy Performance: Lighting Power (1–5 points)

EQ Credit 1.2: Optimize Energy Performance: Lighting Controls (1–3 points)



EQ Credit 1.3: Optimize Energy Performance: HVAC (5–10 points)

EQ Credit 1.4: Optimize Energy Performance: Equipment & Appliances (1–4 points)

CaGBC LEED®–NC Variation: (1–10 points)

CaGBC LEED®–CI Variation: EQ Credit 1 is split into categories as follows:

EQ Credit 1.1: Optimize Energy Performance: Lighting Power (1–3 points)

EQ Credit 1.2: Optimize Energy Performance: Lighting Controls (1 point)

EQ Credit 1.3: Optimize Energy Performance: HVAC (1–2 points)

EQ Credit 1.4: Optimize Energy Performance: Equipment & Appliances (1–2 points)

Dreamwalls® Color Glass Contribution:

In general, this credit refers to strategies to optimize energy usage and performance. Four fundamental strategies are used to increase energy performance: reduce demand, harvest free energy, increase efficiency and recover waste energy.

Specifically, the use of back-painted glass in interior components aids in harvesting site energy by increasing daylight penetration throughout the space and reducing the requirement for electric lighting.

Wall covering, interior doors, shelving components and glass furniture components, using Dreamwalls color glass, are some of the possible applications that could be used to satisfy objectives such as the increase in lighting quality.



LEED® Category: *Indoor Environmental Quality*

IE Q Credit 4.5: Low-Emitting Materials—Systems Furniture and Seating

LEED® Credit Range: 1 point

Intent

To reduce the quantity of indoor air contaminants that are odorous, irritating and/or harmful to the comfort and well-being of installers and occupants.

Requirements

All systems furniture¹ and seating² that was manufactured, refurbished or refinished within 1 year prior³ to occupancy must meet 1 of the options below.

OPTION 1

Furniture and seating are Greenguard Indoor Air Quality Certified.

OR

OPTION 2

Calculated indoor air concentrations that are less than or equal to those listed in Table 1 for furniture systems and seating determined by a procedure based on the EPA Environmental Technology Verification (ETV) Large Chamber Test Protocol for Measuring Emissions of VOCs and Aldehydes (September 1999) testing protocol conducted in an independent air quality testing laboratory.

OR

OPTION 3

Calculated indoor air concentrations that are less than or equal to those listed in Table 1 for furniture systems and seating determined by a procedure based on ANSI/BIFMA M7.1-2007 and ANSI/BIFMA X7.1-2007 testing protocol conducted in an independent third-party air quality testing laboratory.

The requirement in Section 5 of ANSI/BIFMA X7.1-2007 is waived for LEED purposes. Section 5 requires that laboratories used to perform the emissions testing and/or provide analytical results must be independently accredited to ISO/IEC 17025, "General requirements for the competence of testing and calibration laboratories."

Potential Technologies & Strategies

Specify low-VOC materials in construction documents. Ensure that VOC limits are clearly stated in each section where furniture assemblies are addressed.



Potential Strategies using Dreamwalls® Color Glass

Dreamwalls Color Glass in both the glass and acid-etched variety are low-emitting materials for use as desktops, reception desks, demountable walls, cabinet inserts, and partitions. We can work with OEMs and furniture/cabinetry manufacturers to get Dreamwalls Color Glass specified into their products.

1 Systems furniture is defined as either a panel-based workstation comprised of modular interconnecting panels, hang-on components and drawer/filing components, or a freestanding grouping of furniture items and their components that have been designed to work in concert. Furniture other than systems furniture and task and guest chairs used with systems furniture is defined as occasional furniture and is excluded from the credit requirements.

2 Seating is defined as task and guest chairs used with systems furniture

3 Salvaged and used furniture that is more than 1-year-old at time of occupancy is excluded from the credit requirements.



LEED® Category: Indoor Environmental Quality

Credit: IEQ Credit 6.1: Controllability of Systems: Lighting (not available for CS)

LEED® Credit Range: 1 point

Intent: Provide a high level of lighting system control by individual occupants or groups in multi-occupant spaces (i.e. classrooms or conference areas) and promote their productivity, comfort and well-being.

Requirements: Provide individual lighting controls for 90% (minimum) of the building occupants to enable adjustments to suit individual task needs and preferences.

AND

Provide light system controllability for all shared multi-occupant spaces to enable adjustments that meets group needs and preferences.

Exemplary Performance: This credit is not eligible for exemplary performance under the Innovation in

CaGBC LEED®–NC Variation:

EQ Credit 6.1: Controllability of Systems: Perimeter Spaces

EQ Credit 6.2: Controllability of Systems: Non-Perimeter Spaces

Intent: Provide a high level of thermal, ventilation and lighting system control by individual occupants or specific groups in multi-occupant spaces (i.e. classrooms or conference areas) to promote the productivity, comfort and well-being of building occupants.

Requirements: EQ Credit 6.1: Provide at least an average of one operable window and one lighting control zone per 18.5m² (200 ft²) for all regularly occupied areas within 5m (15 ft) of the perimeter wall.

Requirements: EQ Credit 6.2: Provide controls for each individual for airflow, temperature and lighting for at least 50% of the occupants in non-perimeter, regularly occupied areas.

Dreamwalls® Color Glass Contribution:

This credit refers to adjustable lighting for individual tasks or in common areas. Integration of surface materials selection (i.e. high reflectance surfaces) and lighting design may create opportunities to reduce the number of installed lighting fixtures. Daylighting can be integrated within the ambient lighting scheme to compensate for the reduced footcandle levels. When daylighting is used as a component of the lighting design, glare control is also necessary - Dreamwalls Color Glass acid-etched products could satisfy that concern.



LEED® Category: Indoor Environmental Quality

Credit: IEQ Credit 8.1: Daylight & Views: Daylight 75% of Spaces

LEED® Credit Range: 1–2 points (NC & CS), 1–3 points (Schools)

Intent: To provide for the building occupants a connection between indoor spaces and the outdoors through the introduction of daylight and views into the regularly occupied areas of the building.

Requirements:

Option 1: Simulation Not applicable for silvered glass

Option 2: Prescriptive Not applicable for silvered glass

Option 3: Measurement– Demonstrate, through records of indoor light measurements, that a minimum daylight illumination level of 25 footcandles has been achieved in at least 75% of all regularly occupied areas. Measurements must be taken on a 10-foot grid for all occupied spaces and shall be recorded on building floor plans.

Only the square footage associated with the portions of rooms or spaces meeting the minimum illumination requirements may be counted in the calculations.

For all projects pursuing this option, provide daylight redirection and/or glare control devices to avoid high-contrast situations that could impede visual tasks. Exceptions for areas where tasks would be hindered by daylight will be considered on their merits.

Option 4: Combination Not applicable for silvered glass

Exemplary Performance: (NC & CS) This credit may be eligible for exemplary performance under the Innovation in Design section if the project achieves 95% daylighting based on the credit requirements and guidelines. (Schools) This credit may be eligible for exemplary performance under the Innovation in Design section if the project achieves daylighting for 90% of all classrooms and 95% daylighting in all other regularly occupied non-classroom spaces based on the credit requirements and guidelines.

USGBC LEED® Variation – Schools:

Classroom Spaces	Points
75%	1
90%	2

OR



75% of all other regularly occupied spaces (1 additional point). Project teams can achieve a point for these other spaces only if they have also achieved at least 1 point for classroom spaces.

USGBC LEED®-CI Variation – Schools:

Classroom Spaces	Points
75%	1
90%	2

Dreamwalls® Color Glass Contribution:

This credit addresses the availability of daylight to a building’s occupants. When designing for maximum daylight, designers must evaluate and balance a number of environmental factors, such as heat gain and loss, glare control, visual quality and variations in daylight availability.

Dreamwalls® Color Glass can be used in a variety of applications and help achieve LEED® credits by maximizing the lighting factor in building interiors. Building designers can also offer the added benefits of a low maintenance product.



LEED® Category: Indoor Environmental Quality

Credit: IEQ 8.2: Daylight & Views: Views for 90% of Spaces

LEED® Credit Range: 1 point

Intent: Provide building occupants a connection to the outdoors through the introduction of daylight and views into the regularly occupied areas of the building.

Requirements: Achieve a direct line of sight to the outdoor environment via vision glazing between 30 inches and 90 inches above the finish floor for building occupants in 90% of all regularly occupied areas. Determine the area with direct line of sight by totaling the regularly occupied square footage that meets the following criteria:

- In plain view, the area is within sight lines drawn from perimeter vision glazing.
- In section view, a direct sight line can be drawn from the area to perimeter vision glazing.

The line of sight may be drawn through interior glazing. For private offices, the entire square footage of the office may be counted if 75% or more of the area has direct line of sight to perimeter vision glazing. For classrooms and other multi-occupant spaces, the actual square footage with a direct line of sight to perimeter vision glazing is counted.

Additional requirement for Core & Shell: The core and shell design must incorporate a feasible tenant layout(s) per the default occupancy counts (or some other justifiable occupancy count) that can be used in the analysis of this credit.

Exemplary Performance: Exemplary performance may be demonstrated for this credit by meeting 2 of the following 4 measures:

1. 90% or more of regularly occupied spaces have multiple lines of sight to vision glazing in different directions at least 90 degrees apart.
2. 90% or more of regularly occupied spaces have views that include views of at least 2 of the following 3 options: 1) vegetation, 2) human activity, or 3) objects at least 70 feet from the exterior of the glazing.
3. 90% or more of regularly occupied spaces have access to unobstructed views located within the distance of 3 times the head height of the vision glazing.
4. 90% or more of regularly occupied spaces have access to views with a view factor of 3 or greater.

USGBC LEED®—CI Variation: IEQ Credit 8.2: Daylight & Views: Views for Seated Spaces.

Section View Requirement: In section view, a direct sight line can be drawn from a point 42 inches above the floor (typical seated eye height) to perimeter vision glazing.

CaGBC LEED®—NC Variation: Additional requirements:



- Areas directly connected to perimeter windows must have a glazing-to-floor area ratio of at least 0.07.
- For multi-occupant spaces, if the view area of any applicable room exceeds 90%, the entire square footage of the room can be counted.
- Parts of the floor area with horizontal view angles of less than 10° at 1.27m (50") above the floor cannot be included in this calculation.
- Areas not directly connected to perimeter windows must have a horizontal view angle of at least 10° at 1.27m (50") above the floor involving 50% or more of the floor area. If a room meets these requirements then the entire room area is considered to meet the view requirement.

CaGBC LEED®—CI Variation:

EQ Credit 8.2: Daylight & Views: Daylight for 90% of Spaces: Follow the requirements for EQ Credit 8.1 for a minimum of 90% of regularly occupied spaces.

Dreamwalls® Color Glass Contribution:

Use Dreamwalls Color Glass to provide colors and patterns to bring the effect of nature into the building's interior, increasing overall satisfaction of occupants to their work environment.



LEED® Category: Indoor Environmental Quality

Credit: IEQ 9: Enhanced Acoustical Performance (for Schools only)

LEED® Credit Range: 1 point

Intent: To provide classrooms that facilitates better teacher-to-student and student-to-student communications through effective acoustical design.

Requirements:

Sound Transmission

Design the building shell, classroom partitions and other core learning space partitions to meet the Sound Transmission Class (STC) requirements of ANSI Standard S12.60-2002, Acoustical Performance Criteria, Design Requirements and Guidelines for Schools, except windows, which must meet an STC rating of at least 35.

AND

Background Noise

Reduce background noise level to 40 dBA or less from heating, ventilating and air conditioning (HVAC) systems in classrooms and other core learning spaces.

Exemplary Performance: This credit may be eligible for exemplary performance under the Innovation in Design section if the project achieves an outdoor background noise level of 55 dBA for playgrounds and 60 dBA for athletic fields and all other schools grounds, or an indoor noise level of 35 dBA.

Dreamwalls® Color Glass Contribution:

Dreamwalls® Color Glass is available in laminated form. Laminated glass products can add a significant level of noise reduction over non-laminated products. The use of this type of system allows for the combination of enhanced acoustical control with daylight harvesting.



POTENTIAL ID CREDITS

LEED® Category: Innovation in Design

Credit: ID 1: Innovation in Design

LEED® Credit Range: 1–5 points (1–4 points for Schools)

Intent: To provide design teams and projects the opportunity to achieve exceptional performance above the requirements set by the LEED® Green Building Rating System and/or innovative performance in Green Building categories not specifically addressed by the LEED® Green Building Rating System.

Requirements: Credit can be achieved through any combination of the paths below:

PATH 1. Innovation in Design (1–5 points for NC & CS, 1–4 points for Schools) in the LEED® 2009 for New Construction and Major Renovations, LEED® 2009 for Core and Shell Development, or LEED® 2009 for Schools Rating System.

One point is awarded for each innovation achieved. No more than 5 points (for NC & CS) and 4 points (for Schools) under IDc1 may be earned through PATH 1 – Innovation in Design.

Identify the following in writing:

- The intent of the proposed innovation credit.
- The proposed requirement of compliance.
- The proposed submittals to demonstrate compliance.
- The design approach (strategies) used to meet the requirements.

PATH 2. Exemplary Performance (1–3 points)

Achieve exemplary performance in an existing LEED® 2009 for Schools prerequisite or credit that allows exemplary performance as specified in the LEED® Reference Guide for Green Building Design & Construction, 2009 Edition. An exemplary performance point may be earned for achieving double the credit requirements and/or achieving the next incremental percentage threshold of an existing credit in LEED®.

One point is awarded for each exemplary performance achieved. No more than 3 points under IDc1 may be earned through PATH 2 – Exemplary Performance.

CaGBC LEED®–NC Variation: 1 – 4 points available

CaGBC LEED®–CI Variation: 1 – 4 points available



Potential ID Credit #1:

Intent: Reduce the quantity of indoor air contaminants that are odorous, irritating and/or harmful to the comfort and well-being of installers and occupants.

Requirement: Develop a comprehensive strategy to reduce VOC levels by selecting items such as materials, furniture, maintenance coatings and others that introduce low- or no-VOC's and that meet or exceed the South Coast Air Management District Rule 1113. Demonstrate extensive use of these products and verify that their use is not a code requirement or industry standard practice.

Dreamwalls® Color Glass Contribution:

The intent of this credit is to limit VOC's in the building through the selection of materials, furniture, maintenance coatings and other items that are not covered by IEQ Credit 4.1–4.4. Dreamwalls® Color Glass have no, or below trace elements of, VOC's. Its use in walls, doors, and furniture, or as dry-erase boards in place of allergen-related products such as chalkboards, provides a wide range of design options with no (or below trace amounts of) VOC's introduced into the site.

Unlike drywall or millwork, Dreamwalls® Color Glass need no painting during construction and no repainting, refinishing or similar post-installation maintenance which eliminates VOC's and irritating fumes. In addition, a purely mechanical installation can avoid the need for potential air contaminants such as those emitted by some silicone or adhesives. Dreamwalls Color Glass also requires no hazardous materials for cleaning after installation or during maintenance.

Potential ID Credit #2:

Intent: To build a comprehensive, interactive educational program within the LEED® certified building to demonstrate and promote the use of sustainable building features and practices.

Dreamwalls® Color Glass Contribution:

The durability, design flexibility and low maintenance properties of Dreamwalls® Color Glass make this a valuable material to use for enhancing the features of the space or to impart information through signage and exhibits. It can be combined with digital printing on the second-surface to create signage that is protected and is remarkably easy to clean. Permanent markers, paint, and other traditional graffiti tools can be washed or easily lifted off with a single-sided razor blade.



LEED® Category: Materials & Resources

Credit: MR Credit 5: Regional Materials

LEED® Credit Range: 1–2 points

Intent: To increase demand for building materials and products that are extracted and manufactured within the region, thereby supporting the use of indigenous resources and reducing the environmental impacts resulting from transportation.

Requirements: Use building materials or products that have been extracted, harvested or recovered, as well as manufactured, within 500 miles of the project site for a minimum of 10% or 20%, based on cost, of the total materials value. If only a fraction of a product or material is extracted, harvested, or recovered and manufactured locally, then only that percentage (by weight) can contribute to the regional value. The minimum percentage regional materials for each point threshold are as follows:

Regional Materials	Points
10%	1
20%	2

Mechanical, electrical and plumbing components and specialty items such as elevators and equipment must not be included in this calculation. Include only materials permanently installed in the project. Furniture may be included if it is included consistently in MR Credit 3: Materials Reuse through MR Credit 7: Certified Wood.

Potential Technologies & Strategies: Establish a project goal for locally sourced materials, and identify materials and material suppliers that can achieve this goal. During construction, ensure that the specified local materials are installed, and quantify the total percentage of local materials installed. Consider a range of environmental, economic and performance attributes when selecting products and materials.

Dreamwalls® Color Glass Contribution:

Dreamwalls® Color Glass is made in North Carolina, Texas, and Arizona. These locations across the U.S. increase the likelihood that a 500-mile radius is possible. If necessary, Gardner Glass Products can help provide weight per square foot calculations to LEED Architects so they can determine the % by weight of their total product's regional value.

