



Decorative Glass Product's Conformance to
The LEED® Green Building Rating System™
For New Construction and Major Renovations

(Leadership in Energy and Environmental Design)

As described by the U.S. Green Building Council

LEED, Version 2.2

Goldray Industries Ltd.
4605 – 52 Ave. S.E.
Calgary, Alberta, Canada
T2C 4N7



Toll Free: 800-640-3709
Ph: 403-236-1333
Fax: 403-236-1373
www.goldrayindustries.com

Sustainability has been defined by the Brundtland Commission as “meeting the needs of the present generation without compromising the ability of future generations to meet their own needs.” In architecture and construction, sustainability refers to reducing the environmental impact of building designs in the short term and in the long term, creating buildings and communities that are part of the natural world, being regenerative and supportive of all other living systems.¹ The main concern when developing the overall design of sustainable or “green” buildings is the integration of all of the components to ensure that everything works together and that, in the end, the whole is greater than the sum of its parts.

The Leadership in Energy and Environmental Design (LEED®) Green Building Rating System represents the U.S. Green Building Council’s effort to provide a national standard for what constitutes a “green building”. Green design not only makes a positive impact on public health and the environment, it also reduces operating costs, enhances building and organizational marketability, potentially increases occupant productivity, and helps create a sustainable community.²

The LEED rating system is a voluntary, consensus-based national standard for developing high-performance, sustainable buildings. Although USGBC does not certify, promote, or endorse products and services of individual companies, products and services do play a role and can help projects with credit achievement. *Product manufacturers and service providers are vital to advancing USGBC's mission of market transformation.*

This document describes the ways in which decorative glass products manufactured by Goldray Industries Ltd. are consistent with the intent of the LEED Rating System. The information has been developed using general or typical information on Goldray glass products to allow our customers easier access to new construction or renovation projects through the use of decorative glass as a building material. 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.

This document is intended to provide general information only. Goldray does not make any warranty, either expressly or implied, as to the suitability or completeness of the information contained herein.

Energy & Atmosphere Section – EA Credit 1: Optimize Energy Performance

Intent - Achieve increasing levels of energy performance above the baseline to reduce environmental and economic impacts associated with excessive energy use. Depending on the percentage improvement of energy performance, this credit is worth between one and ten points towards LEED certification.

¹ Mendler S., Odell W., Lazarus M., *The HOK Guidebook to Sustainable Design*, John Wiley & Sons Inc., NJ 2006, 2nd Ed.

² U.S. Green Building Council, *LEED for New Construction Reference Guide*, Version 2.2, 2005

Decorative Glass Contribution - Using glass in certain applications can reduce the requirement for electric lighting within a building. Non-traditional uses of glass such as floors, stairs, walls and ceilings allow the designer to utilize natural or existing light as an alternate to electric light. Adding decorative components to the glass surface also provides a measure of control to the light being introduced into each area. In addition, Low E and other solar control types of glass on the exterior of a building will increase the natural lighting while limiting the thermal effects of infrared energy and solar heat gain. This, in turn, has the potential to reduce the energy required for the HVAC system.

Possible Applications - In general, products or strategies that reduce the load on the HVAC system have the potential to contribute towards LEED credits within this section.

- a. Passive heating and/or cooling systems - The simplest method to achieve this involves shielding the building from the sun, thereby reducing thermal loads. By utilizing decorative glass into the exterior glazing design, sun control can be integrated into the design to shade windows in the summer so that heating occurs during the winter months only. Examples here are silkscreened glass used as sun shades, operable louvers and insulated glass units made with high performance Low E coatings.
- b. Integration of daylighting strategies into the design - In a typical building, the perimeter 15 feet of space can be entirely lit by daylight during daytime hours; however, the depth of this zone can be increased to up to 45 feet when appropriate daylighting strategies are used.³ Decorative glass is an excellent product for use in atria, clerestories, glass partition walls and skylights to provide additional daylight within the building's interior. Glass stairways also fit well in this category as they permit more natural light deeper into the building. By using decorative glass as a component of an effective daylighting strategy, energy efficient lighting systems can then be used to support this daylighting system, not vice versa.

Materials & Resources: LEED Credits MR Credit 4.1: Recycled Content: 10% (post-consumer + ½ pre-consumer), MR Credit 4.2: Recycled Content: 20% (post-consumer + ½ pre-consumer).

Intent - Increase demand for building products that incorporate recycled content materials, thereby reducing impacts resulting from extraction and processing of virgin materials.

Decorative Glass Contribution – Although float glass manufacturers typically use 20% pre-consumer recycled materials in their manufacturing process, for the purpose of this LEED Credit, this is considered reclaimed rather than recycled material and is specifically excluded for credit.

Possible Applications - Most decorative glass products in themselves are not applicable to the recycled content credit, however, many framing systems are made with a high percentage of recycled aluminum or other metals and decorative glass can be incorporated into the design of floors, walls, ceilings and exterior glazing.

³ Mendler S., Odell W., Lazarus M., *The HOK Guidebook to Sustainable Design*, John Wiley & Sons Inc., NJ 2006, 2nd Ed.

- a. Use modular building products - Modular designs for flooring and walls can be reconfigured easily to enhance long-term flexibility as the needs of the building occupants change. Many modular products are completely deconstructable, disassemblable and are manufactured using recycled content. Traction coatings for flooring, and translucent or opaque coatings for walls allow the designer to incorporate decorative glass into the overall space design, which fits well with the “long life – loose fit” concept.
- b. Recyclable material – Although LEED Credits do not apply, some types of decorative glass are completely recyclable at the end of their useful life if not previously contaminated with glazing materials. Examples of this are clear and cast glass, satin etch and glass silkscreened with ceramic frit. Laminated glass, mirror and some other types of coatings are not recyclable.

Indoor Environmental Quality: LEED Credit EQ Credit 8.1: Daylight & Views: Daylight for 75% of spaces, EQ Credit 8.2: Daylight & Views: Daylight for 90% of spaces.

Intent – 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.

Decorative Glass Contribution - Decorative glass can be used in a variety of applications and help achieve LEED credits by increasing the daylight factor within a building. By using glass to provide the connection between indoor occupants and the outdoors, building designers can also offer the added benefits of a low maintenance product and superior sound control. Many decorative techniques can also be used to vary the degree of light transmission, making decorative glass a versatile material for use in floors, walls, ceilings, and furniture, as well as in the more traditional doors and windows.

Possible Applications – Decorative glass is an excellent way to maximize both the controlled use of daylight as well as views from the building’s interior to outdoor green spaces.

- a. Indoor green spaces - In the design plan, consider the development of indoor green spaces that utilize atria or skylights. These applications can benefit from solar control and increased flexibility of design through many different decorative glass techniques.
- b. Acoustical properties - When planning acoustical separation between sources of noise inside and outside the building, laminated glass outperforms monolithic glass in acoustical control. Adding a decorative component to laminated glass allows the designer to incorporate colors and textures to fit within the overall design of the space.
- c. Interior sunshading - Where appropriate, interior sunshading can be utilized to reduce heat gain and improve visual comfort. Incorporating decorative techniques into the glazing has the potential to reduce amount of money required for shades, blinds or draperies. In addition, skylights or laminated glass louvers can be produced with silkscreened patterns that provide solar control to achieve the desired shading coefficient.
- d. Effective daylighting strategy - Space planning can be coordinated with the daylighting strategy to ensure that program areas that benefit most from daylight are located in

perimeter zones. A silkscreened pattern or satin etch glass that is incorporated into the design of perimeter glazing has the ability to allow the required amount of daylight into the building while still providing a level of sun control to reduce glare.

- e. Increase daylight zone - The use of light shelves and light redirecting glazing can be used to project daylight deeper into the building interior. These strategies have the potential to extend the daylighting zone from 15 to up to 45 feet. Also consider the use of laminated glass bridges, stairways and floors to allow daylight to penetrate further into the building's interior.
- f. Bring nature indoors – Colors, textures and patterns applied to glass allow the designer to bring the effect of nature into the interior of a building, increasing the overall satisfaction of building occupants with their work environment.

Innovation and Design Process: LEED Credit ID Credit 1-1.4: Innovation in Design

Intent – To provide design teams and projects the opportunity to be awarded points for exceptional performance above the requirements set by the LEED Green Building Rating System and/or innovative performance in Green Building categories not specifically address by the LEED Green Building Rating System.

Decorative Glass Contribution - More and more, architects and designers are exploring opportunities to enhance flexibility and future adaptability within their building and space designs. In addition, materials used within these designs are being scrutinized much more heavily for their sustainable properties at all points throughout their life cycle. Optimal materials are those that incorporate a closed material loop and produce no waste.

- a. Use modular building products - Modular designs for flooring and walls can be reconfigured easily to enhance long-term flexibility as the needs of the building occupants change. Traction coatings for flooring, and translucent or opaque coatings for walls allow the designer to incorporate decorative glass into the overall space design, which fits well with the “long life – loose fit” concept.
- b. Superior building materials – An important consideration when designing a green building is to balance environmental performance goals with traditional performance requirements. Longer lasting, low maintenance and cost effective building materials can easily be incorporated into any design. Decorative glass outperforms many other materials such as drywall or millwork in terms of durability, maintenance and longevity within a building and has the potential to provide a higher level of energy performance.