



Contribution of  
Saflex<sup>®</sup> and Vanceva<sup>®</sup>  
PVB interlayers  
to **LEED<sup>®</sup> V4.1**  
**green building**  
**certification**

saflex   
ENHANCE YOUR VISION

vanceva   
A WORLD OF COLOR



## What is LEED®?

**LEED (Leadership in Energy and Environmental Design)** is the most widely used green building certification system in the world. It was developed by the U.S. Green Building Council and is available for virtually all building types, including new construction, interior fit-outs, operations and maintenance, and core and shell—providing a framework for healthy, highly efficient, and cost-saving green buildings. LEED certification is a globally recognized symbol of sustainability achievement and leadership.

The LEED standard focuses on improving energy use, lowering the carbon footprint, investing in water conservation, and improving indoor air quality. It focuses on material selection, access to light, impacts of the site selection decisions, and more.

The latest version of certification, LEED V4.1, raises the bar on building standards to address energy efficiency, water conservation, site selection, material selection, daylighting, and waste reduction.

# LEED®

LEADERSHIP IN ENERGY AND ENVIRONMENTAL DESIGN

## How does LEED work?

Projects pursuing LEED certification earn points for green building strategies across several categories. Based on the number of points achieved, a project earns one of four LEED rating levels: Certified, Silver, Gold, or Platinum.

The LEED certification program certifies green buildings, spaces, neighborhoods, homes, cities, and communities. The LEED rating system awards points for meeting the credit category requirements points for the environmental performance of buildings based on whole-building characteristics and comprehensive strategies used in the project. LEED credits are not awarded based on the use of a singular product; project teams will need to comply with a certain percentage of all products and materials permanently installed in the project to meet the performance standards and requirements cited in the LEED rating system. The Green Business Certification Institute (GBCI), which provides certification for the LEED program, does not certify, endorse, or promote any products, services, or companies within the standard requirements.

Platinum	Gold	Silver	Certified
80+ points earned	60–79 points earned	50–59 points earned	40–49 points earned





## How can Saflex® interlayers contribute to LEED® V4.1 green certification?

Saflex® and Vanceva® polyvinyl butyral (PVB) interlayers bond with glass to form laminated safety glass.

The interlayer sandwiched between the layers of glass is responsible for the enhanced performance characteristics of laminated glass.

Beyond the main primary functionality of safety and security that it provides to glazing, Saflex® PVB enables improved structural, acoustic, thermal management (solar control), and UV performance as well as biodiversity protection with unique bird-collision prevention.

As such, Saflex interlayers can help meet LEED V4.1 criteria indirectly, contributing to four of the nine LEED credit categories (highlighted on the right). Contribution depends on building design factors, including glass type and configuration; the combination of glass; proper design and installation; and interaction with other construction materials.

Integrative Process	Water Efficiency	<b>Indoor Environmental Quality</b>
Location and Transportation	<b>Energy and Atmosphere</b>	Innovation
Sustainable Sites	<b>Material and Resources</b>	Regional Priority

## LEED® V4.1 credit categories that Saflex may support with total points in the credit category

Categories	Credit	Points from category/credit
Energy and Atmosphere (EA)	Optimize energy performance	Up to 18
Material and Resources (MR)	Building life-cycle impact reduction	Up to 4
	Material ingredients	Up to 2
Indoor Environmental Quality (EQ)	Low-emitting materials	Up to 3
	Thermal comfort	1 possible
	Daylight	Up to 3
	Quality views	1 possible
	Acoustic performance	1 possible
Innovation (IN)	Innovation in design <i>Pilot credits: bird collision deterrence</i>	Up to 5





## Optimize energy performance

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

► **Requirements:** Analyze efficiency measures, focusing on load reduction and HVAC-related strategies (passive measures are acceptable) appropriate for the facility. Project potential energy savings and holistic project cost implications related to all affected systems.

## How can Saflex contribute?

Glass can enable substantial energy efficiency savings in the areas of heating, lighting, and cooling management.

Modern glazing systems can help minimize solar heat gains (g-value) by controlling infrared wavelengths participating in heat built up in the nearby space. In well-designed window and glazing configurations, the use of Saflex® Solar PVB interlayers or Vanceva® PVB interlayers can assist in earning points as part of the passive cooling strategy of the LEED V4.1 optimize energy performance credit category.

In addition, the use of Saflex Solar has a minimal impact on the daylight and quality view credits.

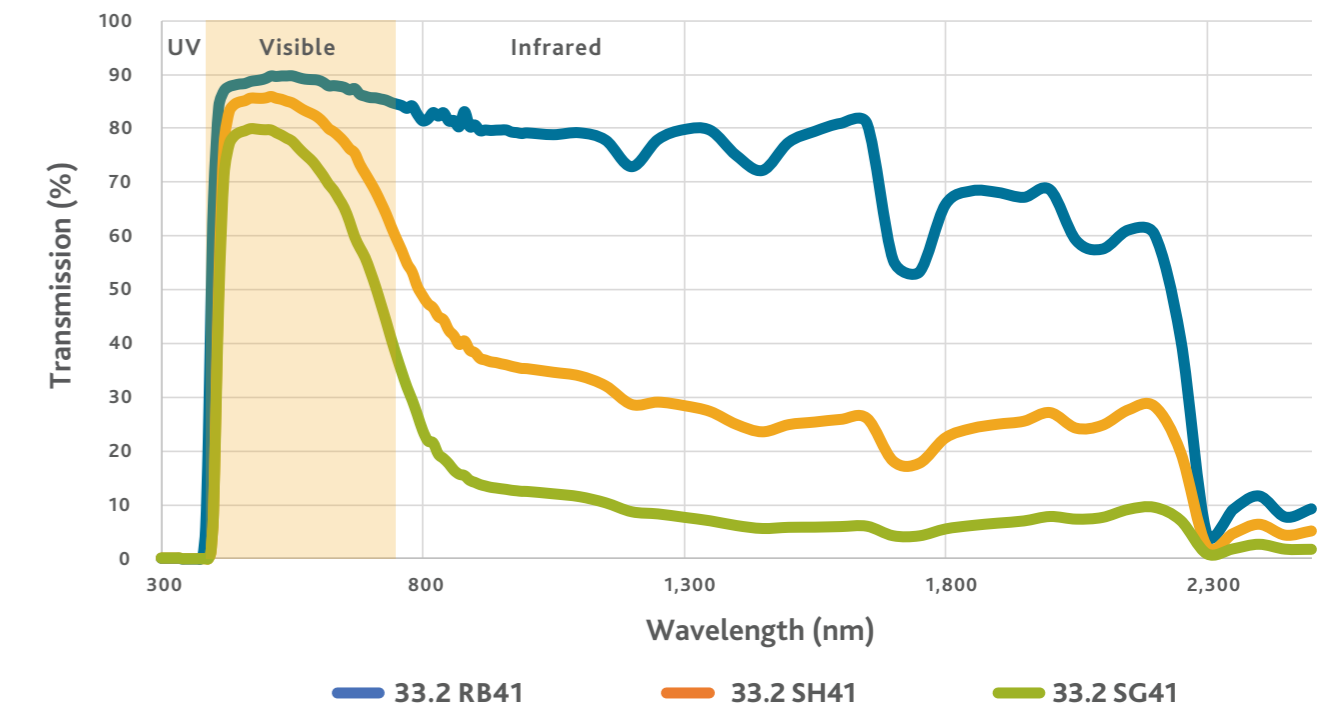
## Saflex solar-absorbing PVB interlayers reduce solar heat gain.

Saflex Solar interlayers are high-visible-light-transmittance, infrared (IR) radiation-absorbing interlayers designed to enhance solar heat gain performance. They are the PVB solutions of choice for applications where coated glass may not be available for solar control, uniform angular color is desired, edge deletion may be visible, or glass needs to be bent and laminated while delivering solar heat gain control. Two options are available in Saflex Solar:

- **Saflex® Solar SG PVB interlayer**, our highest-performing solar-absorbing interlayer (requires strengthened glass)
- **Saflex® Solar SH PVB interlayer**, a more color-neutral appearance that may be laminated with annealed glass



## Comparison of Saflex Clear, Saflex Solar SH, and Saflex Solar SG





# MATERIAL AND RESOURCES (MR)

# MATERIAL AND RESOURCES (MR)

## Building life-cycle impact reduction

► **Intent:** To encourage adaptive reuse and optimize the environmental performance of products and materials

► **Requirements from option 2:** To demonstrate a reduction in materials used through life cycle assessment

## How can Saflex contribute?

Eastman has performed cradle-to-gate life cycle assessments (LCA) for its main architectural interlayer solutions. These assessments have been reviewed and certified by Quantis, a leading life cycle consulting firm.

The LCA data for Saflex can be adopted into models created by laminated glass manufacturers to generate their own LCA or to create an Environmental Product Declaration (EPD) for their laminated glass. This information can also be connected to the life cycle data needed for the whole-building LCA (option 2) within this credit category.

Eastman can provide Saflex LCA data on request.



## Material ingredients

► **Intent:** To reward project teams for selecting products in which the chemical ingredients in the product are inventoried using an accepted methodology and for selecting products verified to minimize the use and generation of harmful substances

► **Requirements for option 1—**Use at least 20 different permanently installed products from at least five different manufacturers that use any of the programs described in LEED V4.1, including:

Cradle to Cradle (C2C) Certified Material Health Certificate Product has a C2C Certified Material Health Certificate™ or is Cradle to Cradle Certified® under standard version three or later with a Material Health achievement level at the Bronze level or higher.

## How can Saflex contribute?

Select Saflex PVB interlayers and all Vanceva color PVB interlayers have received a [C2C Certified Material Health Certificate™](#) from the [Cradle to Cradle Products Innovation Institute](#). They can assist laminated glass manufacturers in obtaining Cradle to Cradle Certified® certification that qualifies for this credit. Eastman can provide C2C Certified Material Health Certificate on request.



# INDOOR ENVIRONMENTAL QUALITY (EQ)

## Low-emitting materials

► **Intent:** To reduce concentrations of chemical contaminants that can damage air quality and the environment and to protect the health, productivity, and comfort

► **Requirements:** To use materials from the wall panels product category that meet low-emitting criteria

## How can Saflex contribute?

Laminated glass with Saflex® PVB interlayers emits less than 20 ppm of total volatile organic compounds (TVOC), making these products eligible to fulfill the credit requirements for this category. Saflex volatile organic compound (VOC) emissions have been assessed according to EN 16516 by an accredited third-party laboratory that is in compliance with EN ISO-IEC 17025 accreditation requirements.

Eastman can provide VOC data on request.



# INDOOR ENVIRONMENTAL QUALITY (EQ)

## Thermal comfort

► **Intent:** To promote occupants' productivity, comfort, and well-being by providing quality thermal comfort

► **Requirements:** To meet the requirements for both thermal comfort design

## How can Saflex contribute?

Selecting performance glass can contribute to the direct solar radiation control that may impact occupants during summertime.

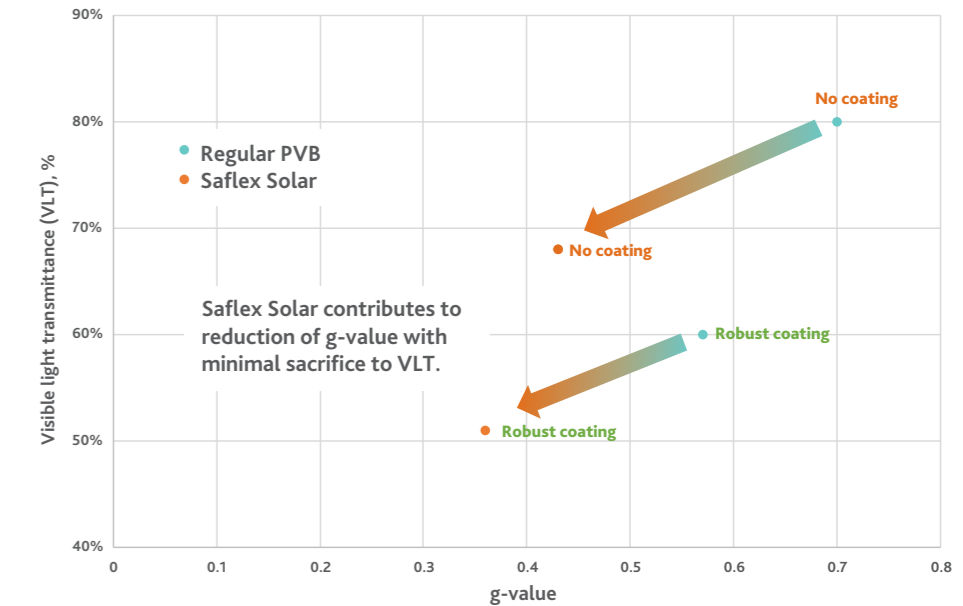
In certain applications, commercial solar-control coatings alone may not be sufficient to reduce the solar heat gain coefficient to desired levels while keeping an acceptable visible light transmission. When used in combination with coatings, **Saflex® Solar PVB interlayers** help reduce the solar heat gain coefficient and balance visible light transmittance.

## Saflex Solar used in combination with coatings

When combined with reflective and/or colored glass coatings, Saflex Solar interlayers can be used to significantly improve the solar heat gain coefficient of facades, even if used in combination with robust solar control coatings. Such a solution reduces UV transmittance and much of the near-infrared radiation while allowing optimal visible light transmittance. While certain coatings can provide the desired reflected color and overall light transmission, the addition of Saflex Solar interlayers improves the luminous efficacy (ratio of light transmittance to the g-value).

Validation of compatibility for individual coating types should be approved by the coating manufacturer. Variables such as choice of glass type, the permanence of adhesion, and other durability characteristics should be considered when assessing overall performance.

Because appropriate thermal management is tied to the insulation of the envelope, Saflex Solar solutions may indirectly support this credit.





# INDOOR ENVIRONMENTAL QUALITY (EQ)

## Daylight

► **Intent:** To connect building occupants with the outdoors, reinforce circadian rhythms and reduce the use of electrical lighting by introducing daylight into the space

► **Requirements:** To simulate spatial daylight autonomy

## Quality views

► **Intent:** To give building occupants a connection to the natural outdoor environment by providing quality views

► **Requirements:** Views must be through glass with a visible light transmittance above 40%. If glazing has frits, patterns, or tints, the view must be preserved. Neutral gray, bronze, and blue-green tints are acceptable.

## How can Saflex contribute?

When glass is used in the envelope or interior walls, building occupants are typically able to view their surroundings and have access to daylight, which is incredibly important for mental health and productivity.

Whenever the safety function of the glass is required and laminated glass is chosen as a solution, Saflex solutions with natural transparency minimize the negative impact on the glass's visible light transmittance, depending on the grade and color used. For example:

**Saflex® Crystal Clear PVB interlayers:** Low-iron glass creates greater connectivity between spaces and allows natural light to transmit without the green tint found in clear glass. Enhancing the beauty and natural appeal of low-iron glass, Saflex Crystal Clear remains virtually undetectable at any visible angle and in any light.

Saflex Crystal Clear has a **color-rendering index (CRI) of 100** and, therefore, will not affect the color rendering of daylight.



Saflex® Crystal Clear laminated with low-iron glass (left); monolithic low-iron glass (right)

# INDOOR ENVIRONMENTAL QUALITY (EQ)

## Vanceva® Color PVB interlayers

**Vanceva® Color PVB interlayers** enhance the style of laminated safety glass. Combining color and white interlayers, they can produce more than 69,000 transparent, translucent, or solid colored glass choices.

Laminated glass made with Vanceva delivers effective protection from harmful UV radiation, glare, and solar energy transmittance. Depending on the color used and/or its combination, it is possible to manage a balance between shading, tinting, and light transmittance performance.

Vanceva® Smoke Grey, Ocean Grey, Shale, Limestone, Dolomite, and Marine PVB interlayers can specifically contribute to meeting the color requirements of this criteria.

## Vanceva® Earth Tones technical information

Color name	Code	Solar transmittance %	Visible light transmittance %	Absorptance (solar)	Solar heat gain coefficient (SHGC)
Marine	S-3773	64	72	0.30	0.73
Marine	S-3773	63	72	0.31	0.72
Shale	S-6540	47	42	0.47	0.62
Shale	S-6544	47	43	0.47	0.62
Smoke Grey	0003	67	78	0.27	0.75
Ocean Grey	000H	59	61	0.33	0.69
Dolomite	S-6452	51	53	0.43	0.65
Dolomite	S-6452	50	52	0.45	0.64
Limestone	S-5558	53	56	0.42	0.66

## Saflex® FlySafe 3D PVB interlayer

**Saflex® FlySafe 3D PVB interlayers** offer a highly effective, low-coverage bird-collision deterrent.

With very minimal obstruction from the interior view, this new innovative solution uses discreet and optimally placed sequins to avert birds without compromising views—unlike bird-protection glass that uses screen printing, etching, or UV coating solutions.



# INDOOR ENVIRONMENTAL QUALITY (EQ)

## Acoustic performance

► **Intent:** To provide workspaces and classrooms that promote occupants' well-being, productivity, and communications through effective acoustic design

► **Requirements:** To meet two of the following credit criteria for all occupied spaces—HVAC background noise, sound transmission, and/or reverberation time

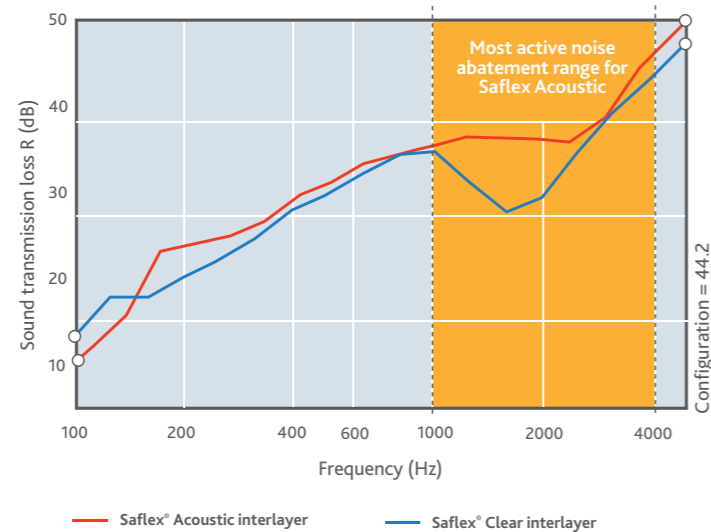
## How can Saflex contribute?

Whether for interior glazed applications that enable privacy, security, and comfort or for facade applications to isolate interior building spaces from exterior noise environments, **Saflex® Acoustic PVB interlayers** can contribute to sound transmission reduction.

Saflex Acoustic is an advanced tri-layer system designed to decouple and disseminate sound waves for superior sound damping performance. This patented system targets sound in the 1,000–3,000 Hz range, which is the most sensitive range of human hearing.

These interlayers enhance the acoustic performance of a glazing by 2 dB in  $R_w$  or STL when compared to a standard PVB interlayers and up to 4 dB compared to monolithic glass of the same thickness

## Sound transmission loss<sup>1,2</sup>



<sup>1</sup>Sound transmission loss of laminated glass with Saflex Acoustic interlayer and Saflex Clear interlayer; configuration = 44.2

<sup>2</sup>The ability to reduce noise as perceived by the human ear can be measured. This measurement involves sending specific frequencies of sound through a material, in this case, laminated glass with Saflex Acoustic interlayer, and remeasuring what comes through the glass to determine what gets filtered out. The transmission loss is recorded and can be illustrated in graphical form as shown in the figure.

### NOTE:

All documents presented in this section are based on samples prepared in Eastman laboratories. Testing certifications from third-party laboratories had a limited number of samples evaluated and are valid for materials tested and not guaranteed for all samples. Samples evaluated at Eastman are tested in accordance with noted standards and procedures. Laboratories are responsible for securing their own performance certificates based on the lamination process.



# INNOVATION (IN)

## Innovation

► **Intent:** To encourage projects to achieve exceptional or innovative performance to benefit human and environmental health and equity

► **Requirements:** To achieve one pilot credit from USGBC's LEED Pilot Credit Library

## How can Saflex contribute?

The reflective technology in **Saflex® FlySafe™ 3D PVB interlayers** can assist in achieving the LEED® 4.1 pilot credit for bird collision deterrence.

Saflex® FlySafe™ 3D addresses the global challenge of birds colliding with glass in buildings. This unique solution gives architects and facade engineers the freedom to create visually stunning buildings while still protecting birds. FlySafe 3D is recognized in the industry and by ornithologists as one of the best with minimal obscuring of views and long-lasting durability.







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