

VITRO ARCHITECTURAL GLASS

Sustainable in Every Light



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CORPORATIVO LEGARIA FASE I

Location: Mexico City, Mexico
Product: *Solarban®* R100 Glass
Architect: ZVA Arquitectos
Glazing Contractor: HEG
Glass Fabricator: Lindes
(formerly Vidrios Marte)

(Cover)

NEMOURS/ALFRED I. DUPONT HOSPITAL FOR CHILDREN

Location: Wilmington, Delaware
Product: *Solarban®* 70XL / *Azuria®* Glass
Architect: FKP Houston
General Contractor: Skanska
Glass Fabricators: Cristacurva;
Oldcastle BuildingEnvelope®
Glazing Contractor: RA Kennedy
Photo courtesy of Tom Kessler Photography

Why Specify Vitro Architectural Glass?

Vitro Architectural Glass (formerly PPG Glass), North America's largest glass producer, is exclusively dedicated to glass innovation and fueled by the same people, plants and products that made PPG Glass one of the industry's most respected and reliable commercial glass manufacturers. Our innovative architectural glass products deliver consistent appearance, reliable performance and energy savings. The dependability of Vitro Glass products is conveyed through members of the *Vitro Certified™* Network—a proven group of companies that fabricate Vitro glass products with on-time delivery and responsive service every time, no matter where your project is located. Vitro Architectural Glass products deliver on your design vision through consistency in quality, color and coating appearance—lite after lite, run after run and year after year. That reliability translates into buildings that look and perform the way they were designed to—now and into the future.

Leading the industry

PPG Glass had been a leader in new product innovation and development since 1883. A long series of PPG technological innovations, many still in use today, have greatly improved how buildings look and perform. Introduced in 1934, *Solex®* “heat absorbing” glass, now known as *Solexia®* glass, became the first architectural glass to limit solar heat gain, while *Twindow®*, one of the world's first double-paned insulating glass units, helped insulate millions of homes and buildings. The *Solarban®*

brand family of solar control low-e glasses, introduced in 1964, has continually raised the standard for performance and enabled architects to design with larger expanses of glass than ever before.

Proven product development process

Now Vitro Architectural Glass has more than 500 patents to its credit and an established reputation for innovation, consistency and reliability. The company continually challenges its engineers and R&D

teams to set and then exceed glass industry standards for color neutrality and both optical and spectral performance. That innovation and constant exploration of new and improved architectural glass options translates into more opportunities for architects to realize their design visions with products such as low-iron *Starphire Ultra-Clear™* glass; *Solarban®* 70XL glass, the world's first MSVD triple-silver-coated low-e glass; and now, *Solarban®* 90 solar control low-e glass.

EASTSIDE HUMAN SERVICES

Location: Denver

Product: *Solarban®* 70XL Glass

Architect: RNL Architects

Glazing Contractor: Colorado Window Systems

Glass Fabricator: Oldcastle BuildingEnvelope®

Photo courtesy of Frank Ooms



A Legacy of Leadership

130 Years of Innovation



1883

The Pittsburgh Plate Glass (PPG) Company is founded, establishing the first plate glass plant in the United States.

1920s

PPG becomes one of the first companies to successfully mass-produce glass. The patented Pittsburgh process accelerates production and minimizes waves and other imperfections common to plate glass.

1934

Solex® glass is introduced as the first environmental, green-tinted, heat-absorbing glass. The product, now known as *Solexia*® glass, remains popular with architects today as part of Vitro Glass's collection of blue and green performance tinted glasses.

1939

Waterwhite low-iron glass, the precursor to today's low-iron *Starphire Ultra-Clear*™ glass, is installed on Frank Lloyd Wright's Fallingwater.



1945

Twindow® is unveiled as one of the world's first double-paned insulating glasses, foreshadowing the green building movement by promising to keep homes and buildings "warmer in the winter and cooler in the summer."



1920s

1930s

1940s

1950s

1981

One PPG Place, designed by Philip Johnson, becomes the showcase for a new generation of high-performance *Solarban*® glasses.



1989

Azurlite® glass (now *Azuria*® glass), a spectrally selective, blue-green glass, is introduced. The Atlantis Resort in the Bahamas was one of the first large installations of the product.



1990

Low-iron *Starphire Ultra-Clear*™ glass is introduced at GlasTec '90 in Dusseldorf, Germany. It remains the industry's clearest, most transparent float glass.



2000

Re-engineered *Solarban*® glass ushers in a new era of solar control low-e glasses that continue to set the standard for energy-saving performance, as installed at Heinz Field, Pittsburgh.



1952

Solex® glass (now *Solexia*® glass) is installed on the historic Lever House in New York City, launching the era of the glass-clad modernist building.



1963

PPG becomes the first glass manufacturer in the United States to use the float glass process, which remains the predominant method of glass-making today.



1964

Colonnade Plaza, formerly the Mutual of Omaha Office in Miami, designed by architect Minoru Yamasaki, was the first building to feature high-performance *Solarban*® glass.



1972

Solarcool® reflective glasses are launched, ushering in a major advance in heat-reflective coatings and a world's first. Shown here on the General Motors Headquarters, Detroit.



1960s

1970s

1980s

1990s

2000s

2010s

2005

Solarban® 70XL glass, the industry's first triple-silver-coated, solar control low-e glass, is introduced at the GreenBuild International Conference and Expo. With a light-to-solar gain (LSG) ratio of 2.37, *Solarban*® 70XL glass remains unrivaled for its combination of solar control and visible light transmittance (VLT). The Terry Thomas in Seattle is a 2009 AIA COTE winner.



2010

Solarban® R100 glass is introduced to provide high VLT with neutral reflectivity, as shown on Kean University's Green Lane Building; Union, New Jersey; an Engineering News Record "best project."



2013

Solarban® 67 glass is introduced with a proprietary solar control low-e coating that reflects the true timbre and brightness of ambient light and color. It is shown here with *Optiblu*® glass on the award-winning Legacy ER in Allen, Texas.



2015/2016

Solarban® 90 is introduced. This glass, which combines exceptional solar control performance with the aesthetic appeal of clear glass, allows for larger expanses of glass with improved occupant comfort. In 2016, PPG became part of Vitro Architectural Glass.



Glass and Energy Management

Over the past half-century, glass has enhanced its profile and capabilities as a critical asset in the design and development of green buildings. Beyond its obvious versatility as a building and decorative material, glass offers architects the environmental advantage of being forged from basic ingredients, such as silica sand, soda-ash and limestone, that are both plentiful and relatively inexpensive. Yet, the most significant reason for glass's favor with architects is its dual ability to transmit light and mitigate the effects of solar heat gain. Few building materials balance these competing functions so deftly, and thanks to ongoing advances from Vitro Glass in glass formulation, engineering and design, there is tangible promise for even more eco-effective glasses in the future.

Setting the standard for performance

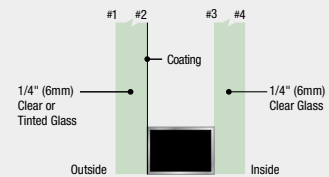
The primary purpose of solar control low-e glasses, such as the *Solarban*® glasses described on pages 9-13, is to reduce solar heat gain, which is quantified by solar heat gain coefficient (SHGC). Passive low-e glasses, including *Sungate*® 400 glass detailed on page 14, are designed to transmit solar heat energy into buildings, generating higher SHGCs. Both passive and solar control low-e glasses also provide the benefit of improved u-value. Lower numbers indicate better performance in both SHGC and u-values.

WYNDHAM DESERT BLUE | Location: Las Vegas | Products: *Pacifica*® Glass, *Solarban*® z50 Glass
Architect: KGA Architecture | General Contractor: Martin-Harris Construction
Glass Fabricator: Oldcastle BuildingEnvelope® | Glazing Contractor: Walters & Wolf
Photo courtesy of Tom Kessler Photography



Understanding glass performance

Dual-pane or “standard” insulating glass units (IGUs) provide four potential coating surfaces. The first (#1) surface faces outdoors; the fourth (#4) faces directly indoors. The two surfaces inside the IGU, which face each other and are separated by an airspace and an insulating spacer, are referred to as the second (#2) and third (#3) surfaces.

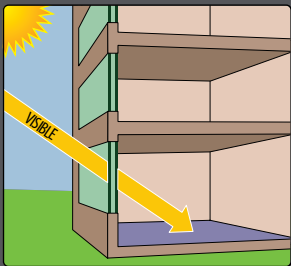


Magnetron-sputtered vacuum deposition (MSVD) coatings, or “soft” coats, such as *Solarban*® solar control low-e coatings, must be glazed within the IGU on the second (#2) or third (#3) surface.

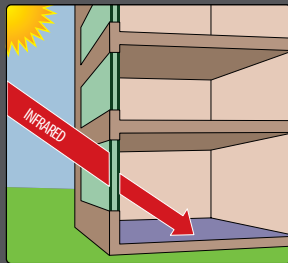
**ROBESON COUNTY DEPARTMENT
OF SOCIAL SERVICES**
Location: Lumberton, North Carolina
Product: Solarban® 70XL Glass
Architect: Little & Associates
Glass Fabricator: Trulite Glass and Aluminum Solutions
Glazing Contractor: Charlotte Glass
Photo courtesy of Mark Herboth Photography



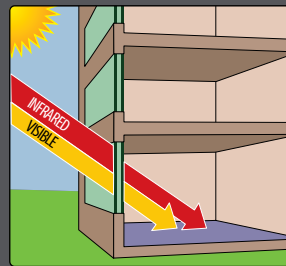
The energy performance of architectural glass is measured according to four critical factors:



1. Visible light transmittance (VLT) gauges the amount of natural light a glass transmits into a building. To compare, the glass with the industry's highest VLT, *Starphire Ultra-Clear™* glass by Vitro Glass, transmits 84 percent of the sun's available light in a 1-inch insulating glass unit (IGU). On the other end of the scale, *Graylite®* II glass, a dark-tinted gray glass made by Vitro Glass, transmits only 8 percent of the available sunlight.

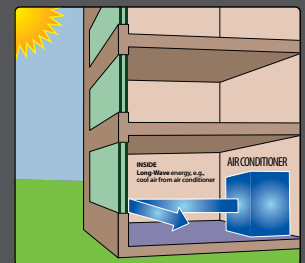


2. Solar heat gain coefficient (SHGC) quantifies the amount of solar energy (heat) that passes directly into a building through the glass. Glasses with the lowest SHGCs block the highest percentage of solar heat. In a 1-inch IGU, *Starphire®* glass has an SHGC of 0.82, which means it blocks only 18 percent of the sun's heat energy. Conversely, because of its dark gray tint, *Graylite* II glass offers an SHGC of 0.21, which means it reflects 79 percent of the ambient solar radiation.



3. Light-to-solar gain (LSG) ratio is the ratio of visible light transmittance (VLT) to solar heat gain coefficient (SHGC).

Glazings with an LSG ratio of 1.25 or greater have been defined as spectrally selective by the U.S. Department of Energy's Federal Energy Management Program (FEMP) guidelines for commercial glazings.



4. U-Value quantifies a glass's insulating ability (or ability to act as a thermal barrier between indoor air and outdoor air). Glasses with lower u-values are better insulators than glasses with higher u-values.

Meeting the *Cradle to Cradle Certified™* Product Standard

PPG once again led the industry by becoming the first North American float glass manufacturer to have its products meet the *Cradle to Cradle Certified™* product standard. Today, Vitro Glass offers more C2C-certified architectural glasses than any other float glass manufacturer.

To earn C2C certification, Vitro Glass products are independently evaluated to measure their total life-cycle impact on human health and the environment. The assessment considers critical variables, such as how efficiently water and energy are used in their manufacture, the sustainability and reusability of their material ingredients, and the commitment of Vitro Glass corporate management to socially responsible business practices, environmental stewardship, social fairness and ethical business standards.



**Our glass products
have met the
Cradle to Cradle Certified™
product standard
since 2008.**



NASA SUSTAINABILITY BASE

Location: Moffet Field, California

Product: Solarban® 70 XL Glass

Architect: William McDonough + Partners, AECOM

General Contractor: Swinerton Builders

Glass Fabricator: Oldcastle BuildingEnvelope®

LEED® Platinum Design Standard

Photo courtesy of Cesar Rubio

NASA Sustainability Base, which showcases NASA technology, is a net energy positive building, meaning it generates more energy than it uses. Designed to meet LEED Platinum standards, it has won numerous awards, including the U.S. General Services Administration Award for Green Innovation.

BULLITT CENTER

Location: Seattle

Products: Solarban® 60 Glass, Starphire® Glass

Architect: The Miller Hull Partnership

Glazing Contractor: Goldfinch Brothers

Glass Fabricator: Northwestern Industries, Inc.

Photo courtesy of Tom Kessler Photography

Bullitt Center meets the *Living Building Challenge*™ standard, the world's most rigorous green design and construction guideline.



**SAN FRANCISCO PUBLIC UTILITIES
COMMISSION BUILDING**
Location: San Francisco
Products: *Solarban® 70XL Glass, Starphire® Glass*
Architects: KMD Architects
Glass Fabricator: Hartung Glass Industries
Glazing Contractor: Benson Industries
LEED® Platinum Certified
AIA COTE Award Winner, 2013
Photo courtesy of Bruce Damonte



Solarban® Solar Control Low-E Glasses

For sustainable buildings, architects seek transparent glass that transmits high levels of natural light while blocking the energy-draining effects of the sun.

Vitro Glass has produced more than 700 million square feet of *Solarban®* low-e glass for commercial buildings around the globe, adding beauty while delivering immeasurable energy savings.

Solarban® 90 glass

The latest evolution in solar control low-e glass, *Solarban®* 90 glass conveys a neutral appearance similar to that of clear glass in both color and reflectance, whether viewed from the interior or exterior of a building. Combining new materials with advanced coating technology and refinements to proven triple-silver-coating technology, *Solarban®* 90 glass is engineered to outperform even *Solarban®* 70XL glass, the most preferred high-performance solar control low-e glass in North America.

Solarban® 90 glass has the versatility to be paired with

Starphire Ultra-Clear™ glass or an array of performance-tinted glasses to provide a broad range of aesthetic and performance options.

When paired with clear glass in a standard 1-inch insulating glass unit (IGU), *Solarban®* 90 glass offers a solar heat gain coefficient (SHGC) of 0.23, visible light transmittance (VLT) of 51 percent, and an exceptional light-to-solar gain (LSG) ratio of 2.22.

Solarban® 70XL glass

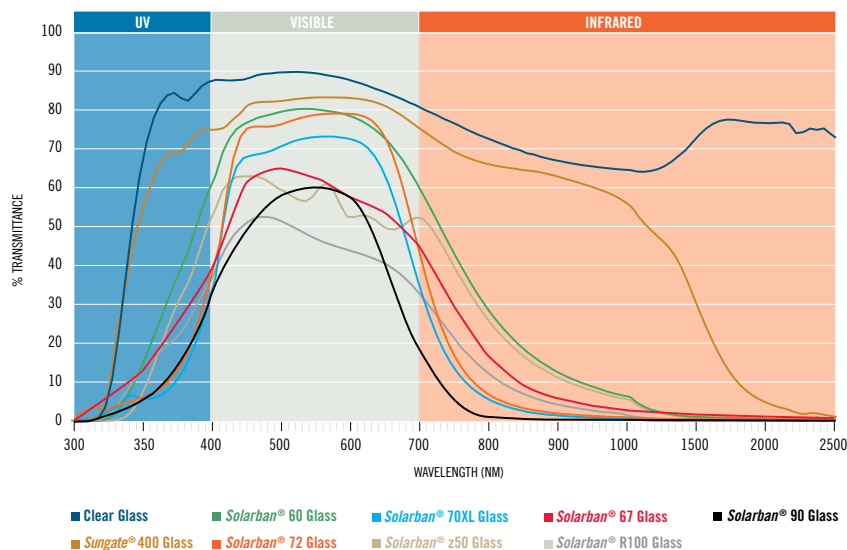
Solarban® 70XL glass, a technological breakthrough in solar control low-e glass, offers a balanced combination of VLT, solar control and clarity.

With an SHGC of 0.27 and VLT of 64 percent in a 1-inch IGU, *Solarban®* 70XL glass produces an LSG ratio of 2.37, which places it among the highest-performing glasses available.

For a tinted glass appearance in an IGU, *Solarban®* 70XL glass can be used on the second (#2) or third (#3) surface with many of the performance tinted glasses from Vitro Glass.



SPECTRAL CURVE



Solar performance

As this chart illustrates, when compared to conventional clear glass, *Solarban®* solar control low-e glasses significantly limit the amount of solar radiation that enters a building from the infrared (heat energy) portion of the solar spectrum, while *Sungate®* 400 passive low-e glass is designed to allow more solar radiation. Light transmittance from the visible portion of the solar spectrum remains comparatively high. In commercial buildings, it is often ideal to maximize visible light transmittance to optimize daylighting while limiting infrared energy to reduce cooling load.

**LOUIS & PEACHES OWEN
HEART HOSPITAL**

Location: Tyler, Texas

Products: Solarban® 60/Starphire® Glass
and Solarban® R100/Optiblu® Glass

Architect: WHR Architects

Glass Fabricator: Tristar Glass Products

Glazing Contractor: Tyler Glass

Photo courtesy of Aker Imaging



Solarban® 67 glass

Solarban® 67 glass represents an entirely new vision for solar control low-e glass, combining excellent solar performance with a soft, neutral coating that endows commercial buildings with a crisp, clean and brilliantly clear exterior appearance that “pops.”

Our proprietary coating technology enables *Solarban® 67* glass to generate visible light transmittance (VLT) of 54 percent, a solar heat gain coefficient (SHGC) of 0.29 and a light-to-solar gain (LSG) ratio of 1.86 in a 1-inch

insulating glass unit (IGU) — which is superb for such a transparent glass.

Solarban® R100 glass

Solarban® R100 glass is a neutral-reflective low-e glass with an excellent SHGC of 0.23 and VLT of 42 percent. The resulting LSG ratio of 1.83 is 17 percent to 29 percent greater than competing products in its category.

Because of its unmatched balance of moderate reflectivity and color-neutrality, *Solarban® R100* glass can help in providing privacy, and

it harmonizes with spandrels and other building materials.

Inside the building, *Solarban® R100* glass has reflectance of just 14 percent and transmits a pleasant cool-blue appearance that reduces glare without creating an obtrusive reflected color for building occupants. Exterior reflectance of 32 percent combines with the neutral aesthetic to deliver an extraordinarily sharp exterior appearance.

OMNI NASHVILLE HOTEL

Location: Nashville, Tennessee

Product: *Solarban®* R100 Glass

Architect: HKS Inc.

Glass Fabricator: Oldcastle BuildingEnvelope®

Glazing Contractor: Gardner Glass and Metal

LEED® Silver Certified

Photo courtesy of Tom Kessler Photography



Solarban® 72 glass

Solarban® 72 glass builds on the advances of Solarban® 70XL glass to provide even greater levels of transparency and color neutrality with minimal sacrifice of solar control performance. With a triple-silver coating that is engineered for use on *Starphire Ultra-Clear™* glass, Solarban® 72 glass has visible light transmittance (VLT) of 71 percent — 11 percent higher than Solarban® 70XL glass — with a solar heat gain coefficient (SHGC) of 0.30 and a light-to-solar gain (LSG) ratio of 2.37.

Solarban® 60 glass

Solarban® 60 glass features a clear, color-neutral appearance that is available on clear glass, *Starphire Ultra-Clear™* glass or any of the Vitro Glass tinted glasses for a wide array of aesthetic choices.

In a 1-inch insulating glass unit (IGU), Solarban® 60 glass can be used on the second (#2) surface or third (#3) surface to provide a variety of performance and sourcing options. Used on the second surface in an IGU with clear glass, Solarban 60 glass has VLT of 70 percent, an SHGC of 0.39 and an LSG ratio of 1.79.

Solarban® z75 and Solarban® z50 glasses

Solarban® z75 and Solarban® z50 glasses provide a neutral, steel blue-gray appearance, due to the use of *Optiblue®* glass. They manage light transmittance to balance daylighting and control glare, while complementing surrounding building materials, including other high-performance glazings.

While the two glasses have a similar appearance, the coatings for each provide different levels of solar control to maximize performance in local climates.

In a standard 1-inch IGU with clear glass, Solarban® z75 glass has an SHGC of 0.24 and VLT of 48 percent, with an LSG ratio of 2.00. These characteristics make Solarban® z75 glass a great choice for warmer climates.

In the same configuration, Solarban® z50 glass has an SHGC of 0.32, VLT of 51 percent and an LSG ratio of 1.59. Consequently, Solarban® z50 glass is more suited for climates with balanced heating and cooling seasons.

Low interior reflectance levels for both glasses deliver clear, natural outdoor views.



PRUDENTIAL CENTER | Location: Newark, New Jersey | Product: Solarban® 60/Starphire® Glass | Architects: Morris Adjmi Architects, HOK Sport+Venue+Event
Glass Fabricator: JE Berkowitz, LP | Glazing Contractor: Josloff Glass | Photo courtesy of Tom Kessler Photography

SANDCRAWLER

Location: Singapore

Product: Solarban® 72 Glass

Architect: HOK

Owner/Developer: Lucasfilm Singapore

Glass Fabricator: AVIC Sanxin

Glazing Contractor: Permasteelisa Group

Photo courtesy of Bill Lyons



Sungate® 400 Passive Low-E Glass

Sungate® 400 glass is a highly transparent, passive low-e glass designed specifically for use in heating-dominated climates. Manufactured with an MSVD “soft coat,” *Sungate® 400* glass helps buildings harvest energy from the sun and retain solar and furnace heat to reduce winter heating costs. *Sungate® 400* delivers a winter u-value that is 9 percent higher than passive low-e glasses manufactured with a “hard” pyrolytic coating.

SUNGATE® 400
Low-E Glass

Solarban® 60 and *Sungate® 400* low-e glasses by Vitro Glass helped the Center for Sustainable Landscapes at Phipps Conservatory and Botanical Gardens meet the Living Building Challenge™ standard; it also received the SITES™ certification for landscapes.

**PHIPPS CENTER FOR SUSTAINABLE LANDSCAPES
CONSERVATORY & BOTANICAL GARDENS**
Location: Pittsburgh
Product: *Solarban® 60*/*Starphire®* Glass,
Sungate® 400/*Starphire®* Glass
Architect: The Design Alliance Architects
General Contractor: Turner Construction Co.
Glass Fabricator: United Plate Glass
Glazing Contractor: D-M Products, Inc.
LEED® Platinum Certified
Photo courtesy of Jim Schafer



Starphire Ultra-Clear™ Glass

Starphire Ultra-Clear™ glass represents the ultimate achievement in highly transparent low-iron glass technology and is the benchmark in the industry. Vitro Glass makes Starphire® glass in a variety of thicknesses for vision glass, safety and security glass, point-fixed glazing, and other specialty and decorative applications.

Extra-heavy Starphire® glass

When conventional clear glass is laminated into multiple layers, or specified in increasing thicknesses, its appearance becomes progressively greener. Starphire Ultra-Clear™ glass, with its signature blue edge, maintains its clarity and true color transmittance at all thicknesses.

Architects can take advantage of this unique attribute by specifying Starphire® extra-heavy glass in thicknesses of up to 3/4-inch or 19 millimeters.



GORES GROUP HEADQUARTERS

Location: Beverly Hills, California

Product: Starphire® Glass

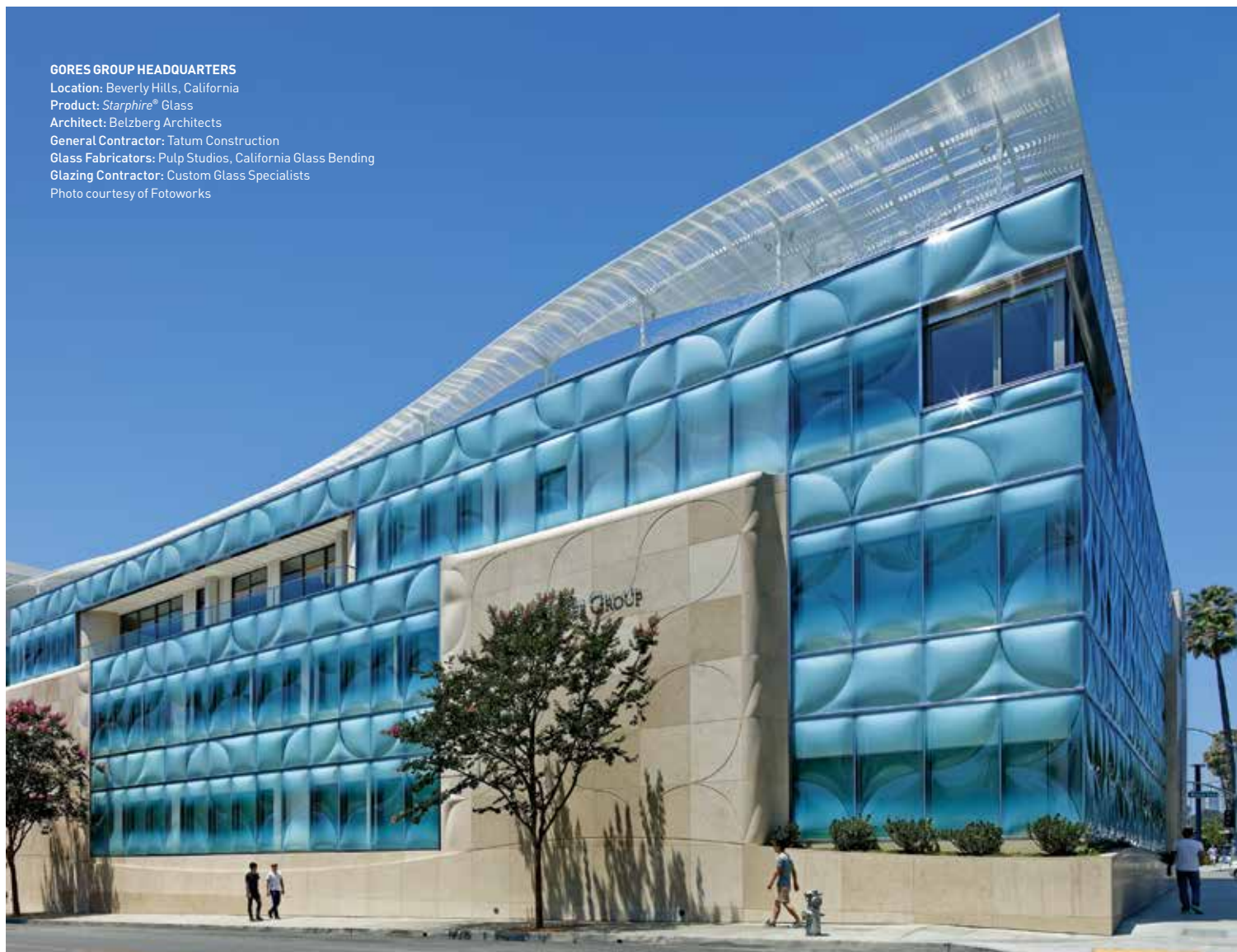
Architect: Belzberg Architects

General Contractor: Tatum Construction

Glass Fabricators: Pulp Studios, California Glass Bending

Glazing Contractor: Custom Glass Specialists

Photo courtesy of Fotoworks



Blue and Green Performance Tinted Glasses



Vitro Glass offers a broad spectrum of blue and green performance tints that provide aesthetic options to design by bringing very natural, environment-blending colors to buildings. While most of these glasses are spectrally selective in a 1-inch insulating unit with clear glass, they can dramatically lower solar heat loads when combined with *Solarban*® glass coatings.

Aesthetic Options

AZURIA® glass offers a stunning aqua-blue hue with visible light transmittance (VLT) of 61 percent and a low solar heat gain coefficient (SHGC) of 0.39.*

ATLANTICA® glass is an emerald-green glass that delivers an SHGC of 0.41, while maintaining 60 percent VLT.*

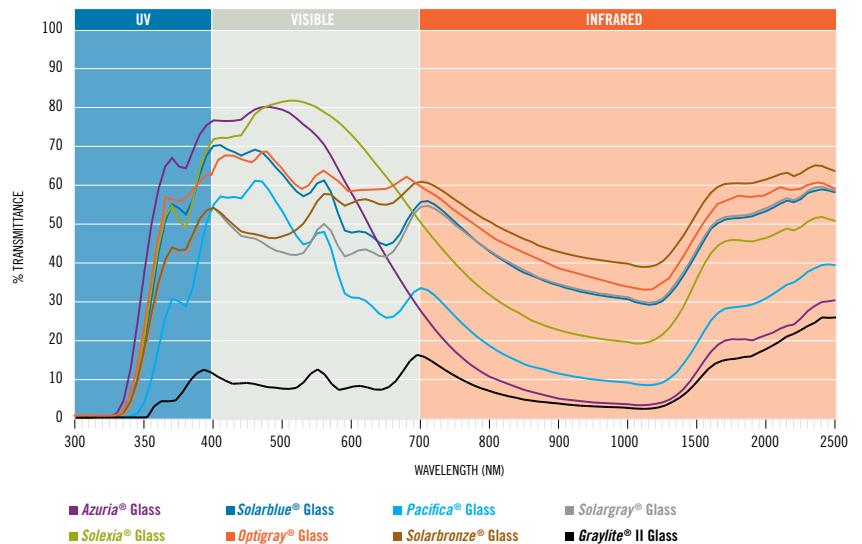
SOLARBLUE® glass features a sparkling, light sky-blue tint that balances high VLT of 50 percent with an SHGC of 0.49.*

SOLEXIA® glass is a light-green tinted glass that has provided high light transmittance and aesthetic solutions to architects and building owners worldwide for decades.

PACIFICA® glass is a deeply saturated true-blue tint with an SHGC of 0.36 and VLT of 38 percent.*

*Performance based on uncoated tint in a 1-inch IGU with clear inboard lite.

SPECTRAL CURVE



Performance tinted glasses

This chart compares the spectral curve of our tinted glasses relative to their ability to block solar heat. Glasses with an LSG ratio of greater than 1.25 are considered spectrally selective, and offer a balance of light transmittance and solar control that can help lower energy consumption in buildings. All Vitro Glass tinted glasses can also be paired with solar control or passive low-e glasses in an IGU to provide additional solar control performance.

Gray and Bronze Performance Tinted Glasses

Vitro Glass offers an expansive series of bronze and gray performance tinted glasses ranging from very neutral, light-transmitting aesthetics to rich, dark glasses that limit transmittance. All can create distinctive looks that blend well with a variety of architectural elements and can be paired with *Solarban*® or *Sungate*® glass coatings for optimum performance.

Aesthetic Options

OPTIGRAY® glass features an ultra-neutral, warm light-gray color designed to complement *Solarban*® solar control low-e glasses and maximize light transmittance and clarity.

SOLARGRAY® glass has a cool medium-gray appearance with a classic, neutral aesthetic favored by many designers and maintains visible light transmittance (VLT) of 40 percent in a 1-inch insulating glass unit (IGU) with clear glass.

GRAYLITE® II glass delivers a rich dark-gray aesthetic that limits light transmittance and heat load while providing glare control and privacy, all with a distinctive color contrast.

SOLARBRONZE® glass offers a warm, bronze appearance that complements a range of hues from adjacent building materials and still offers VLT of 47 percent in a 1-inch IGU with clear glass.



ORTHOPEDIC CENTER AT LANCASTER GENERAL HOSPITAL

Location: Lancaster, Pennsylvania

Products: *Sungate*® 400 Glass, *Solargray*® Glass

Architect: IKM Incorporated

Glass Fabricator: JE Berkowitz, LP

Glazing Contractor: National Glass & Metal Company, Inc.

Photo courtesy of Nathan Cox Photography



Vistacool®

Subtly Reflective Color-Enriched Glasses

The *Vistacool*® family of subtly reflective, color-enriched glasses is engineered to deliver high levels of visible light transmittance (VLT) with a softly reflective appearance that is more understated than the mirror-like aesthetic of traditional reflective glass. Designed as a durable second-surface-only coating, *Vistacool*® glasses are available in two distinct tints that may be combined with *Solarban*® or *Sungate*® brand low-e coatings to achieve light-to-solar gain (LSG) ratios of as high as 1.62.

Aesthetic Options

VISTACOOl® AZURIA® glass offers an exceptionally rich and soothing aqua-blue appearance, together with excellent VLT of 42 percent when teamed with *Solarban*® 60 glass in a 1-inch insulating glass unit (IGU). With a solar heat gain coefficient (SHGC) of 0.26, this combination produces an LSG ratio of 1.62, among the highest of any reflective glass on the market.

VISTACOOl® PACIFICA® glass offers a deep true-blue appearance along with an SHGC of 0.19 when joined in a 1-inch IGU with *Solarban*® 70XL glass. This exceptional solar control combines with VLT of 24 percent.

OMNI FORT WORTH HOTEL
AND 1301 THROCKMORTON, OMNI RESIDENCES
Location: Fort Worth, Texas
Products: *Vistacool*® *Azuria*® Glass, *Solarban*® z50 Glass
Architect: HOK
Glass Fabricator: Oldcastle BuildingEnvelope®
Glazing Contractor: Trainor Glass
Photo courtesy of Tom Kessler Photography



Solarcool® Reflective Glasses

Solarcool® reflective coated glasses were introduced in 1972. For more than 45 years, these proven and highly durable products have enhanced the appearance of thousands of buildings, as well as the comfort of their inhabitants.

When applied to the first (#1) surface, *Solarcool®* glass produces a reflective, metallic sheen. On the second (#2) surface, *Solarcool®* coatings add reflectivity and enrich

the color of six different Vitro Glass tinted glasses.

When combined in a 1-inch insulating glass unit (IGU) with *Solarban®* 70XL glass, *Solarcool®* reflective glasses offer an expansive palette of appearance and performance options with solar heat gain coefficients (SHGCs) ranging from 0.13 to 0.17 and exterior reflectance of up to 22 percent.

Aesthetic Options

	SOLARCOOL® AZURIA® Glass
	SOLARCOOL® PACIFICA® Glass
	SOLARCOOL® SOLARBLUE® Glass
	SOLARCOOL® SOLARBRONZE® Glass
	SOLARCOOL® SOLARGRAY® Glass
	SOLARCOOL® SOLEXIA® Glass

WINTHROP P. ROCKEFELLER CANCER INSTITUTE

Location: Little Rock, Arkansas

Products: *Vistacool® Azuria®* Glass, *Solarban®* 60 Glass

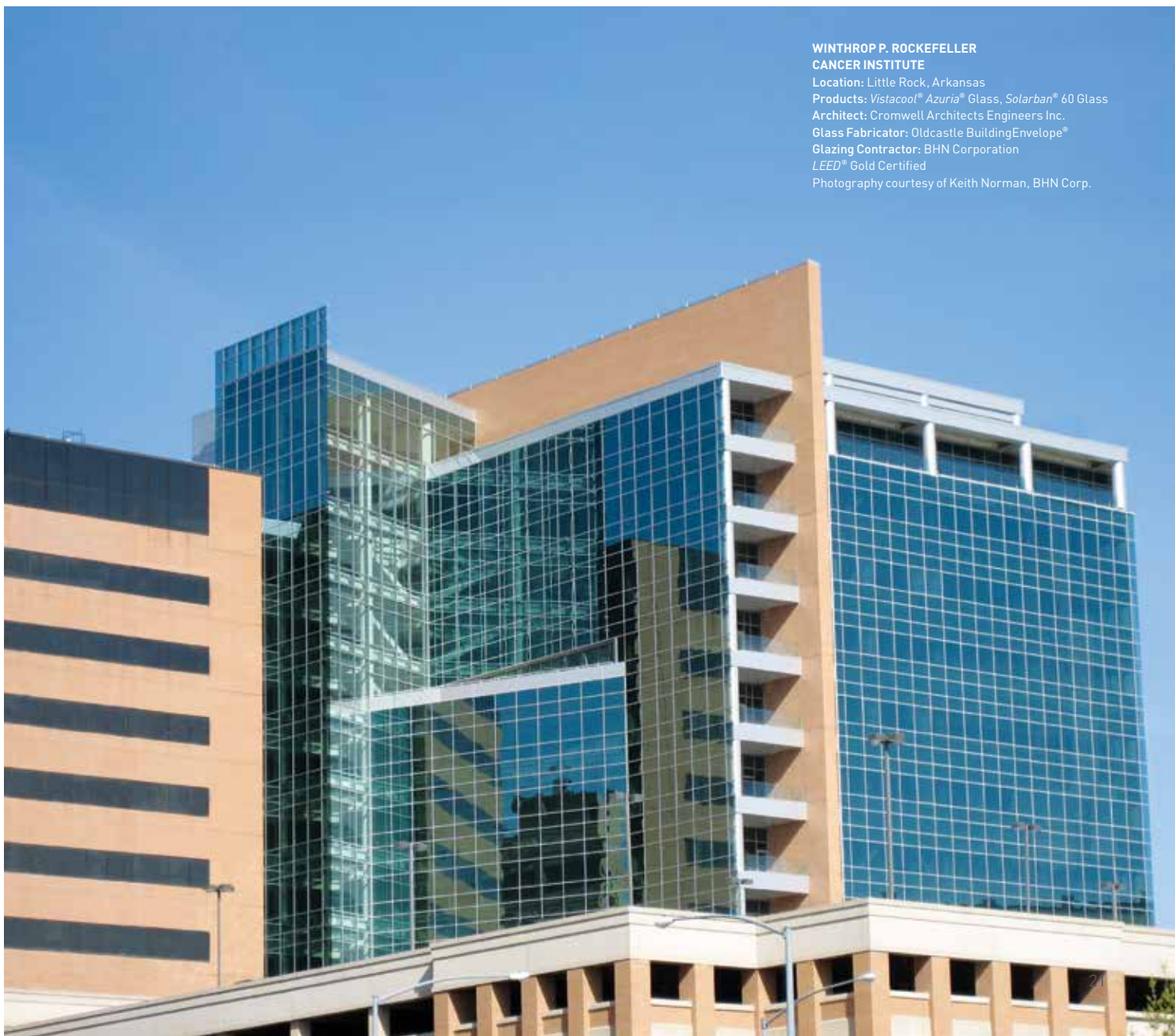
Architect: Cromwell Architects Engineers Inc.

Glass Fabricator: Oldcastle BuildingEnvelope®

Glazing Contractor: BHN Corporation

LEED® Gold Certified

Photography courtesy of Keith Norman, BHN Corp.



OMNI DALLAS CONVENTION CENTER HOTEL

Location: Dallas

Products: Solarban® z50 Glass and Solarban® 70XL/Pacifica® Glass

Architects: BOKA Powell Architects (architect of record),

5Gstudio (design architect)

General Contractor: Balfour Beatty Construction

Glass Fabricator: JE Berkowitz, LP

Photo courtesy of Tom Kessler Photography



Vitro Certified™ Network

Regional sourcing. Superior products. Unmatched service.

The consistency in quality and color, as well as the reliability of performance that Vitro Glass manufactures into its glass products, is maintained throughout the fabrication process by members of the *Vitro Certified™* Network. Fabricators interested in joining the network must pass a demanding vetting process and only proficient, experienced fabricators that understand the intricacies of commercial MSVD glass fabrication and the expectations of glaziers and building owners are invited to participate.

Vitro Certified™ Network members are audited and evaluated on more than 100 critical dimensions, including storage, handling, cutting, washing, edging, IGU construction, record keeping, and process support and analysis to maintain the quality of the final product. As the exclusive source of Vitro Glass high-performance *Solarban®* glass products, and with locations throughout the United States and Canada, a *Vitro Certified™* Fabricator is available to provide quality glass by Vitro Glass where and when you need it.



Vitro Certified™ Fabricators

Vitro Certified™ Laminators

**Vitro Certified™ Architectural
Window Manufacturers**

**Vitro Certified™ International
Fabricators**

**Vitro Certified™ International
Laminators**

Designed with *Solarban®* 70XL glass, one of the highest-performing solar control low-e glasses available, this building's exterior glazing visually connects the slender courtyard-facing office wings, while interior glass walls maximize natural light by drawing it deeper into the internal spaces.

LIVE OAK BANK HEADQUARTERS
Location: Wilmington, North Carolina
Product: *Solarban®* 70XL Glass
Architect: LS3P Associates
Glass Fabricator: Solar Seal Company
Photo courtesy Mark Herboth Photography



Vitro Glass Monolithic Glass Comparisons

Table of Performance Values*1									
Glass Thickness		Visible Light Transmittance (VLT) ²	Visible Light Reflectance ²		(Btu/hr·ft ² ·°F) NFRC U-Value ³		Solar Heat Gain Coefficient (SHGC) ⁴	Light-to-Solar Gain (LSG) ⁵	
Inches	mm		Exterior %	Interior %	Winter Night time	Winter Argon			
Uncoated									
CLEAR Glass									
	1/8	3	90	9	9	1.04	na	0.86	1.05
	5/32	4	90	9	9	1.04	na	0.84	1.07
	3/16	5	89	9	9	1.03	na	0.83	1.07
	1/4	6	89	8	9	1.02	na	0.82	1.09
	5/16	8	87	8	9	1.01	na	0.79	1.10
	3/8	10	87	8	8	1.00	na	0.77	1.13
	1/2	12	85	8	8	0.98	na	0.73	1.16
	5/8	16	84	8	8	0.97	na	0.70	1.20
	3/4	19	83	8	8	0.95	na	0.67	1.24
STARPHIRE® Glass									
	1/8	3	91	8	8	1.04	na	0.91	1.00
	5/32	4	91	8	8	1.04	na	0.91	1.00
	3/16	5	91	8	8	1.03	na	0.90	1.01
	1/4	6	91	8	8	1.02	na	0.90	1.01
	5/16	8	91	8	8	1.01	na	0.89	1.02
	3/8	10	91	8	8	1.00	na	0.89	1.02
	1/2	12	90	8	8	0.98	na	0.88	1.02
	5/8	16	90	8	8	0.97	na	0.87	1.03
	3/4	19	90	8	8	0.95	na	0.86	1.05
SOLEXIA® Glass									
	1/8	3	83	8	8	1.04	na	0.70	1.19
	5/32	4	81	8	8	1.04	na	0.68	1.19
	3/16	5	79	8	8	1.03	na	0.65	1.22
	1/4	6	77	8	8	1.02	na	0.62	1.24
ATLANTICA® Glass									
	1/4	6	67	7	7	1.02	na	0.53	1.26
AZURIA® Glass									
	5/32	4	75	7	7	1.04	na	0.57	1.32
	3/16	5	72	7	7	1.03	na	0.54	1.33
	1/4	6	68	7	7	1.02	na	0.52	1.31
	5/16	8	61	6	6	1.01	na	0.48	1.27
	3/8	10	57	6	6	1.00	na	0.46	1.24
SOLARBLUE® Glass									
	1/4	6	56	6	6	1.02	na	0.61	0.92
PACIFICA® Glass									
	1/4	6	42	5	5	1.02	na	0.49	0.86
SOLARBRONZE® Glass									
	1/8	3	67	7	7	1.04	na	0.73	0.92
	5/32	4	63	7	7	1.04	na	0.70	0.90
	3/16	5	58	6	6	1.03	na	0.67	0.87
	1/4	6	53	6	6	1.02	na	0.63	0.84
	5/16	8	43	6	6	1.01	na	0.57	0.75
	3/8	10	37	5	6	1.00	na	0.53	0.70
	1/2	12	27	5	5	0.98	na	0.47	0.57
OPTIGRAY® Glass									
	1/4	6	63	6	6	1.02	na	0.64	0.98
SOLARGRAY® Glass									
	1/8	3	60	6	7	1.04	na	0.69	0.87
	5/32	4	56	6	7	1.04	na	0.66	0.85
	3/16	5	50	6	6	1.03	na	0.62	0.81
	1/4	6	44	6	6	1.02	na	0.58	0.76
	5/16	8	33	5	6	1.01	na	0.51	0.65
	3/8	10	28	5	5	1.00	na	0.48	0.58
	1/2	12	18	5	5	0.98	na	0.42	0.43

Table of Performance Values*1									
Glass Thickness		Visible Light Transmittance (VLT) ²	Visible Light Reflectance ²		(Btu/hr·ft2·°F) NFRC U-Value ³		Solar Heat Gain Coefficient (SHGC) ⁴	Light-to-Solar Gain (LSG) ⁵	
Inches	mm		Exterior %	Interior %	Winter Night time	Winter Argon			
Uncoated									
GRAYLITE® II Glass									
	1/8	3	24	5	5	1.04	na	0.45	0.53
	5/32	4	18	4	5	1.04	na	0.41	0.44
	3/16	5	13	4	5	1.03	na	0.39	0.33
	1/4	6	9	4	5	1.02	na	0.36	0.25
Coated									
VISTACOOl® (2) AZURIA® Glass									
	1/4	6	52	19	29	1.02	na	0.46	1.13
VISTACOOl® (2) PACIFICA® Glass									
	1/4	6	32	10	28	1.02	na	0.44	0.73
SOLARCOOl® (2) SOLEXIA® Glass									
	1/4	6	30	23	37	1.03	na	0.43	0.70
SOLARCOOl® (1) SOLEXIA® Glass									
	1/4	6	30	37	23	1.03	na	0.37	0.81
SOLARCOOl® (2) AZURIA® Glass									
	3/16	5	27	20	36	1.04	na	0.39	0.69
	1/4	6	26	19	36	1.03	na	0.38	0.68
SOLARCOOl® (1) AZURIA® Glass									
	3/16	5	27	36	20	1.03	na	0.32	0.84
	1/4	6	26	36	19	1.03	na	0.31	0.84
SOLARCOOl® (2) SOLARBLUE® Glass									
	1/4	6	21	14	36	1.02	na	0.45	0.47
SOLARCOOl® (1) SOLARBLUE® Glass									
	1/4	6	21	36	14	1.02	na	0.38	0.55
SOLARCOOl® (2) PACIFICA® Glass									
	1/4	6	16	10	36	1.02	na	0.38	0.42
SOLARCOOl® (1) PACIFICA® Glass									
	1/4	6	16	36	10	1.02	na	0.31	0.52
SOLARCOOl® (2) SOLARBRONZE® Glass									
	1/4	6	21	13	36	1.03	na	0.47	0.45
SOLARCOOl® (1) SOLARBRONZE® Glass									
	1/4	6	21	36	13	1.03	na	0.40	0.53
SOLARCOOl® (2) SOLARGRAY® Glass									
	1/4	6	17	11	36	1.03	na	0.44	0.39
SOLARCOOl® (1) SOLARGRAY® Glass									
	1/4	6	17	36	11	1.03	na	0.37	0.46

1. Data is based on center of glass performance of representative factory production samples. Actual values may vary due to the production process and manufacturing tolerances. All tabulated data is based on NFRC methodology using the LBNL Window 7.3 software.
2. Transmittance and reflectance values based on spectrophotometric measurements and energy distribution of solar radiation.
3. U-Value – A measure of the insulating characteristics of the glass or how much heat gain or loss occurs through the glass due to the difference between indoor and outdoor temperatures and is measured Btu/hr·ft²·°F. The lower the number, the better the insulating performance. This number is the reciprocal of the r-value. Winter argon represents the winter night-time u-value performance when the cavity is filled with a 90% argon/10% air/gas mixture.

4. Solar Heat Gain Coefficient (SHGC) – Measures how well a window blocks (or shades) the heat from sunlight. SHGC is the fraction of solar radiation transmitted through a window or skylight, as well as the amount that is absorbed by the glass and reradiated to the interior. SHGC is expressed as a number between 0 and 1. The lower a window's SHGC, the less solar heat it transmits and the greater the shading ability. The SHGC is similar to the Shading Coefficient (SC), but also accounts for absorbed, converted and inwardly radiated solar energy.
5. Light-to-solar gain (LSG) ratio is the ratio of visible light transmittance to solar heat gain coefficient.

Important glass design considerations and comprehensive technical information, including performance, thermal stress and wind load tools for all Vitro glasses, are available at VitroGlazings.com or by calling **1.855.VTRO.GLS/1.855.887.6457**.

1-Inch Insulating Glass Unit (IGU) Comparisons with Vitro Glass

Insulating Glass Unit Performance Comparisons 1-inch (25mm) units with 1/2-inch (13mm) airspace and two 1/4-inch (6mm) lites									
Outdoor Lite: Coating if Any (Surface) Glass	Glass Type +	Indoor Lite: Coating if Any (Surface) Glass	Visible Light Transmittance (VLT) ²	Visible Light Reflectance ²		(BTU/hr·ft ² ·°F) NFRC U-Value ³		Solar Heat Gain Coefficient (SHGC) ⁴	Light-to-Solar Gain (LSG) ⁵
				Exterior %	Interior %	Winter Night-time	Winter Argon		
Uncoated									
	CLEAR Glass + Clear		79	15	15	0.47	0.45	0.70	1.13
	STARPHIRE [®] + STARPHIRE		84	15	15	0.47	0.45	0.82	1.02
	SOLEXIA [®] + Clear		69	13	15	0.47	0.45	0.50	1.38
	ATLANTICA [®] + Clear		60	11	14	0.47	0.45	0.41	1.46
	AZURIA [®] + Clear		61	11	14	0.47	0.45	0.39	1.56
	SOLARBLUE [®] + Clear		50	9	13	0.47	0.45	0.49	1.02
	PACIFICA [®] + Clear		38	7	13	0.47	0.45	0.36	1.06
	SOLARBRONZE [®] + Clear		47	8	13	0.47	0.45	0.51	0.92
	OPTIGRAY [®] + Clear		56	10	13	0.47	0.45	0.52	1.08
	SOLARGRAY [®] + Clear		40	7	13	0.47	0.45	0.46	0.87
	GRAYLITE [®] II + Clear		8	4	12	0.47	0.45	0.22	0.36
Coated									
SUNGATE [®] 400 Low-E Glass									
	SUNGATE 400 (2) Clear + Clear		76	14	14	0.32	0.28	0.60	1.27
	SUNGATE 400 (2) STARPHIRE + STARPHIRE		80	14	14	0.32	0.28	0.68	1.18
	CLEAR + SUNGATE 400 (3) Clear		76	14	14	0.32	0.28	0.63	1.21
	SOLEXIA + SUNGATE 400 (3) Clear		66	11	13	0.32	0.28	0.44	1.50
	ATLANTICA + SUNGATE 400 (3) Clear		58	10	12	0.32	0.28	0.35	1.66
	AZURIA + SUNGATE 400 (3) Clear		59	10	12	0.32	0.28	0.34	1.74
	SOLARBLUE + SUNGATE 400 (3) Clear		48	8	12	0.32	0.28	0.42	1.14
	PACIFICA + SUNGATE 400 (3) Clear		37	7	11	0.32	0.28	0.30	1.23
	SOLARBRONZE + SUNGATE 400 (3) Clear		46	8	12	0.32	0.28	0.44	1.05
	OPTIGRAY + SUNGATE 400 (3) Clear		54	9	12	0.32	0.28	0.46	1.17
	SOLARGRAY + SUNGATE 400 (3) Clear		38	7	12	0.32	0.28	0.39	0.97
	GRAYLITE II + SUNGATE 400 (3) Clear		8	4	11	0.32	0.28	0.15	0.53
SOLARBAN [®] 60 Solar Control Low-E Glass									
	SOLARBAN 60 (2) Clear + Clear		70	11	12	0.29	0.24	0.39	1.79
	SOLARBAN 60 (2) STARPHIRE + STARPHIRE		74	11	12	0.29	0.24	0.41	1.80
	SOLARBAN 60 (2) SOLEXIA + Clear		61	9	12	0.29	0.24	0.32	1.91
	SOLARBAN 60 (2) ATLANTICA + Clear		53	8	11	0.29	0.24	0.27	1.96
	SOLARBAN 60 (2) AZURIA + Clear		54	8	11	0.29	0.24	0.28	1.93
	SOLARBAN 60 (2) SOLARBLUE + Clear		45	7	11	0.29	0.24	0.28	1.61
	SOLARBAN 60 (2) PACIFICA + Clear		34	6	10	0.29	0.24	0.22	1.55
	SOLARBAN 60 (2) SOLARBRONZE + Clear		42	7	11	0.29	0.24	0.28	1.50
	SOLARBAN 60 (2) OPTIGRAY + Clear		50	8	11	0.29	0.24	0.30	1.67
	SOLARBAN 60 (2) SOLARGRAY + Clear		35	6	10	0.29	0.24	0.25	1.40
	SOLEXIA + SOLARBAN 60 (3) Clear		61	10	10	0.29	0.24	0.37	1.65
	ATLANTICA + SOLARBAN 60 (3) Clear		53	9	10	0.29	0.24	0.31	1.71
	AZURIA + SOLARBAN 60 (3) Clear		54	9	10	0.29	0.24	0.31	1.74
	SOLARBLUE + SOLARBAN 60 (3) Clear		45	7	9	0.29	0.24	0.33	1.36
	PACIFICA + SOLARBAN 60 (3) Clear		34	6	9	0.29	0.24	0.25	1.36
	SOLARBRONZE + SOLARBAN 60 (3) Clear		42	7	9	0.29	0.24	0.32	1.31
	OPTIGRAY + SOLARBAN 60 (3) Clear		50	8	9	0.29	0.24	0.35	1.43
	SOLARGRAY + SOLARBAN 60 (3) Clear		35	7	9	0.29	0.24	0.29	1.21
	GRAYLITE II + SOLARBAN 60 (3) Clear		7	4	8	0.29	0.24	0.13	0.54
SOLARBAN [®] 67 Solar Control Low-E Glass									
	SOLARBAN 67 (2) Clear + Clear		54	19	16	0.29	0.24	0.29	1.86
	SOLARBAN 67 (2) STARPHIRE + STARPHIRE		57	20	16	0.29	0.24	0.30	1.90
	SOLARBAN 67 (2) SOLEXIA + Clear		47	16	16	0.29	0.24	0.25	1.88
	SOLARBAN 67 (2) ATLANTICA + Clear		41	13	16	0.29	0.24	0.22	1.86
	SOLARBAN 67 (2) AZURIA + Clear		42	13	16	0.29	0.24	0.23	1.83
	SOLARBAN 67 (2) OPTIBLUE + Clear		39	12	15	0.29	0.24	0.25	1.56
	SOLARBAN 67 (2) SOLARBLUE + Clear		34	10	15	0.29	0.24	0.22	1.55

Insulating Glass Unit Performance Comparisons 1-inch (25mm) units with 1/2-inch (13mm) airspace and two 1/4-inch (6mm) lites

Outdoor Lite: Coating if Any (Surface) Glass	Glass Type +	Indoor Lite: Coating if Any (Surface) Glass	Visible Light Transmittance (VLT) ²	Visible Light Reflectance ²		(BTU/hr·ft ² ·°F) NFRC U-Value ³		Solar Heat Gain Coefficient (SHGC) ⁴	Light-to-Solar Gain (LSG) ⁵
				Exterior %	Interior %	Winter Night-time	Winter Argon		
Coated									

SOLARBAN® 67 Solar Control Low-E Glass (Continued)

SOLARBAN 67 (2) PACIFICA + Clear	26	8	15	0.29	0.24	0.19	1.37
SOLARBAN 67 (2) SOLARBronze + Clear	32	10	15	0.29	0.24	0.22	1.45
SOLARBAN 67 (2) OPTIGRAY + Clear	38	12	15	0.29	0.24	0.24	1.58
SOLARBAN 67 (2) SOLARGRAY + Clear	27	8	15	0.29	0.24	0.20	1.35
ATLANTICA + SOLARBAN 67 (3) Clear	41	11	18	0.29	0.24	0.29	1.41
AZURIA + SOLARBAN 67 (3) Clear	42	11	18	0.29	0.24	0.29	1.45
SOLARBLUE + SOLARBAN 67 (3) Clear	34	9	18	0.29	0.24	0.30	1.13
PACIFICA + SOLARBAN 67 (3) Clear	26	7	18	0.29	0.24	0.23	1.13
SOLARBronze + SOLARBAN 67 (3) Clear	32	9	18	0.29	0.24	0.29	1.10
OPTIGRAY + SOLARBAN 67 (3) Clear	38	10	18	0.29	0.24	0.32	1.19
SOLARGRAY + SOLARBAN 67 (3) Clear	27	8	18	0.29	0.24	0.26	1.04
GRAYLITE II + SOLARBAN 67 (3) Clear	5	4	18	0.29	0.24	0.12	0.42

SOLARBAN® 70XL Solar Control Low-E Glass[†]

SOLARBAN 70XL (2) + Clear	64	12	13	0.28	0.24	0.27	2.37
SOLARBAN 70XL (2) SOLEXIA + Clear	58	10	13	0.28	0.24	0.27	2.15
SOLARBAN 70XL (2) ATLANTICA + Clear	51	9	12	0.28	0.24	0.24	2.13
SOLARBAN 70XL (2) AZURIA + Clear	52	9	12	0.28	0.24	0.25	2.08
SOLARBAN 70XL (2) SOLARBLUE + Clear	42	8	12	0.28	0.24	0.23	1.83
SOLARBAN 70XL (2) PACIFICA + Clear	32	6	12	0.28	0.24	0.19	1.68
SOLARBAN 70XL (2) SOLARBronze + Clear	40	7	12	0.28	0.24	0.21	1.90
SOLARBAN 70XL (2) OPTIGRAY + Clear	47	8	12	0.28	0.24	0.24	1.96
SOLARBAN 70XL (2) SOLARGRAY + Clear	34	6	12	0.28	0.24	0.20	1.70
SOLEXIA + SOLARBAN 70XL (3) Clear	56	11	12	0.28	0.24	0.32	1.75
ATLANTICA + SOLARBAN 70XL (3) Clear	49	10	11	0.28	0.24	0.28	1.75
AZURIA + SOLARBAN 70XL (3) Clear	49	9	11	0.28	0.24	0.29	1.69
SOLARBLUE + SOLARBAN 70XL (3) Clear	40	8	11	0.28	0.24	0.27	1.48
PACIFICA + SOLARBAN 70XL (3) Clear	31	6	10	0.28	0.24	0.22	1.41
SOLARBronze + SOLARBAN 70XL (3) Clear	38	8	11	0.28	0.24	0.26	1.46
OPTIGRAY + SOLARBAN 70XL (3) STARPHIRE	45	9	11	0.28	0.24	0.29	1.55
SOLARGRAY + SOLARBAN 70XL (3) Clear	32	7	11	0.28	0.24	0.24	1.33
GRAYLITE II + SOLARBAN 70XL (3) Clear	6	4	10	0.28	0.24	0.11	0.55

SOLARBAN® 72 Solar Control Low-E Glass

SOLARBAN 72 (2) STARPHIRE + STARPHIRE	71	13	13	0.29	0.24	0.30	2.37
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SOLARBAN® 90 Solar Control Low-E Glass

SOLARBAN 90 (2) Clear + Clear	51	12	19	0.29	0.24	0.23	2.22
SOLARBAN 90 (2) STARPHIRE + STARPHIRE	54	13	20	0.29	0.24	0.23	2.35
SOLARBAN 90 (2) SOLEXIA + Clear	44	10	19	0.29	0.24	0.22	2.00
SOLARBAN 90 (2) ATLANTICA + Clear	39	9	19	0.29	0.24	0.20	1.95
SOLARBAN 90 (2) AZURIA + Clear	39	9	19	0.29	0.24	0.21	1.86
SOLARBAN 90 (2) OPTIBLUE + Clear	37	8	19	0.29	0.24	0.20	1.85
SOLARBAN 90 (2) SOLARBLUE + Clear	32	8	18	0.29	0.24	0.19	1.68
SOLARBAN 90 (2) PACIFICA + Clear	24	6	18	0.29	0.24	0.17	1.41
SOLARBAN 90 (2) SOLARBronze + Clear	31	7	18	0.29	0.24	0.18	1.72
SOLARBAN 90 (2) OPTIGRAY + Clear	36	8	19	0.29	0.24	0.20	1.80
SOLARBAN 90 (2) SOLARGRAY + Clear	26	6	18	0.29	0.24	0.17	1.53
SOLEXIA + SOLARBAN 90 (3) Clear	44	16	12	0.29	0.24	0.30	1.47
ATLANTICA + SOLARBAN 90 (3) Clear	39	13	12	0.29	0.24	0.26	1.50
AZURIA + SOLARBAN 90 (3) Clear	39	13	12	0.29	0.24	0.27	1.44
SOLARBLUE + SOLARBAN 90 (3) Clear	32	10	11	0.29	0.24	0.25	1.28
PACIFICA + SOLARBAN 90 (3) Clear	24	8	11	0.29	0.24	0.21	1.14
SOLARBronze + SOLARBAN 90 (3) Clear	30	10	11	0.29	0.24	0.24	1.25
OPTIGRAY + SOLARBAN 90 (3) Clear	36	12	11	0.29	0.24	0.27	1.33
SOLARGRAY + SOLARBAN 90 (3) Clear	25	8	11	0.29	0.24	0.22	1.14
GRAYLITE II + SOLARBAN 90 (3) Clear	5	4	11	0.29	0.24	0.11	0.45

1-Inch Insulating Glass Unit (IGU) Comparisons with Vitro Glass

Insulating Glass Unit Performance Comparisons 1-inch (25mm) units with 1/2-inch (13mm) airspace and two 1/4-inch (6mm) lites									
Outdoor Lite: Coating if Any (Surface) Glass	Glass Type +	Indoor Lite: Coating if Any (Surface) Glass	Visible Light Transmittance (VLT) ²	Visible Light Reflectance ²		(Btu/hr·ft²·°F) NFRC U-Value ³		Solar Heat Gain Coefficient (SHGC) ⁴	Light-to-Solar Gain (LSG) ⁵
				Exterior %	Interior %	Winter Night-time	Winter Argon		
Coated									
SOLARBAN® Z50 Solar Control Low-E Glass ^{††}									
	SOLARBAN z50 (2) OPTIBLUE + Clear		51	8	11	0.29	0.24	0.32	1.59
SOLARBAN® Z75 Solar Control Low-E Glass ^{††}									
	SOLARBAN z75 (2) OPTIBLUE + Clear		48	9	12	0.28	0.24	0.24	2.00
SOLARBAN® R100 Solar Control Low-E Glass									
	SOLARBAN R100 (2) Clear + Clear		42	32	14	0.29	0.25	0.23	1.83
	SOLARBAN R100 (2) STARPHIRE + STARPHIRE		44	33	14	0.29	0.25	0.23	1.91
	SOLARBAN R100 (2) SOLEXIA + Clear		36	25	13	0.29	0.25	0.21	1.71
	SOLARBAN R100 (2) ATLANTICA + Clear		32	20	13	0.29	0.25	0.19	1.68
	SOLARBAN R100 (2) AZURIA + Clear		32	21	13	0.29	0.25	0.19	1.68
	SOLARBAN R100 (2) OPTIBLUE + Clear		30	19	13	0.29	0.24	0.20	1.50
	SOLARBAN R100 (2) SOLARBLUE + Clear		26	15	13	0.29	0.25	0.19	1.37
	SOLARBAN R100 (2) PACIFICA + Clear		20	11	13	0.29	0.25	0.16	1.25
	SOLARBAN R100 (2) SOLARBRONZE + Clear		25	15	13	0.29	0.25	0.18	1.39
	SOLARBAN R100 (2) OPTIGRAY + Clear		29	18	13	0.29	0.25	0.20	1.45
	SOLARBAN R100 (2) SOLARGRAY + Clear		21	12	13	0.29	0.25	0.17	1.24
VISTACOOL® Subtly Reflective Glass									
	VISTACOOL (2) AZURIA + Clear		47	21	32	0.47	0.45	0.34	1.38
	VISTACOOL (2) PACIFICA + Clear		29	11	31	0.47	0.45	0.32	0.91
SOLARCOOL® Reflective Glass									
	SOLARCOOL (2) SOLEXIA + Clear		27	24	38	0.47	0.45	0.31	0.87
	SOLARCOOL (2) AZURIA + Clear		24	20	38	0.47	0.45	0.25	0.96
	SOLARCOOL (2) PACIFICA + Clear		15	10	38	0.47	0.45	0.25	0.60
	SOLARCOOL (2) SOLARBLUE + Clear		20	15	38	0.47	0.45	0.32	0.63
	SOLARCOOL (2) SOLARBRONZE + Clear		19	14	38	0.47	0.45	0.34	0.56
	SOLARCOOL (2) SOLARGRAY + Clear		16	11	38	0.47	0.45	0.32	0.50
VISTACOOL® and SOLARCOOL® with SOLARBAN® 60 Solar Control Low-E (3)									
	VISTACOOL (2) AZURIA + SOLARBAN 60 (3) Clear		42	20	24	0.29	0.24	0.26	1.62
	VISTACOOL (2) PACIFICA + SOLARBAN 60 (3) Clear		26	11	23	0.29	0.24	0.21	1.24
	SOLARCOOL (2) SOLEXIA + SOLARBAN 60 (3) Clear		24	24	29	0.29	0.24	0.19	1.26
	SOLARCOOL (2) AZURIA + SOLARBAN 60 (3) Clear		21	19	29	0.29	0.24	0.17	1.24
	SOLARCOOL (2) SOLARBLUE + SOLARBAN 60 (3) Clear		17	14	29	0.29	0.24	0.18	0.94
	SOLARCOOL (2) PACIFICA + SOLARBAN 60 (3) Clear		13	10	29	0.29	0.24	0.15	0.87
	SOLARCOOL (2) SOLARBRONZE + SOLARBAN 60 (3) Clear		17	14	29	0.29	0.24	0.18	0.94
	SOLARCOOL (2) SOLARGRAY + SOLARBAN 60 (3) Clear		14	11	29	0.29	0.24	0.17	0.82
VISTACOOL® and SOLARCOOL® with SOLARBAN® 70XL Solar Control Low-E (3) [†]									
	VISTACOOL (2) AZURIA + SOLARBAN 70XL (3)		38	21	23	0.28	0.24	0.24	1.58
	VISTACOOL (2) PACIFICA + SOLARBAN 70XL (3)		24	11	22	0.28	0.24	0.19	1.26
	SOLARCOOL (2) SOLEXIA + SOLARBAN 70XL (3)		22	24	27	0.28	0.24	0.17	1.29
	SOLARCOOL (2) AZURIA + SOLARBAN 70XL (3)		19	19	27	0.28	0.24	0.15	1.27
	SOLARCOOL (2) SOLARBLUE + SOLARBAN 70XL (3)		16	14	27	0.28	0.24	0.15	1.07
	SOLARCOOL (2) PACIFICA + SOLARBAN 70XL (3)		12	10	27	0.28	0.24	0.13	0.92
	SOLARCOOL (2) SOLARBRONZE + SOLARBAN 70XL (3)		15	14	27	0.28	0.24	0.15	1.00
	SOLARCOOL (2) SOLARGRAY + SOLARBAN 70XL (3)		13	11	27	0.28	0.24	0.14	0.93

† Solarban® 70XL for annealed applications is applied to Starphire® glass; heat treated applications will require either clear or Starphire® glass depending on manufacturing process.

†† Optiblue® is a unique substrate by Vitro Glass designed for use on Solarban® z50, Solarban® z75 and other coated glasses.

1. Data is based on center of glass performance of representative factory production samples. Actual values may vary due to the production process and manufacturing tolerances. All tabulated data is based on NFRC methodology using the LBNL Window 7.3 software.
2. Transmittance and Reflectance values based on spectrophotometric measurements and energy distribution of solar radiation.
3. U-Value – A measure of the insulating characteristics of the glass or how much heat gain or loss occurs through the glass due to the difference between indoor and outdoor temperatures and is measured Btu/hr·ft²·°F. The lower

the number, the better the insulating performance. This number is the reciprocal of the R-value. Winter argon represents the winter night-time u-value performance when the cavity is filled with a 90% argon/10% air/gas mixture.

4. Solar Heat Gain Coefficient (SHGC) – Measures how well a window blocks (or shades) the heat from sunlight. SHGC is the fraction of solar radiation transmitted through a window or skylight, as well as the amount that is absorbed by the glass and reradiated to the interior. SHGC is expressed as a number between 0 and 1. The lower a window's SHGC, the less solar heat it transmits and the greater the shading ability. The SHGC is similar to the Shading Coefficient (SC), but also accounts for absorbed, converted and inwardly radiated solar energy.
5. Light-to-solar gain (LSG) ratio is the ratio of visible light transmittance to solar heat gain coefficient.

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CITY CENTER PLAZA
Location: Bellevue, Washington
Product: Solarban® 70XL Glass
Architect: NBBJ
Glazing Contractor: Walters & Wolf
Glass Fabricator: Northwestern Industries, Inc.
Photo courtesy of Tom Kessler Photography

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