Vitro®
Architectural Glass

PPG Formerly PPG Glass

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 *Optiblue*® 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.

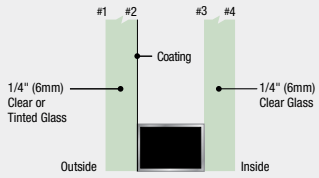
Setting the standard for performance

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

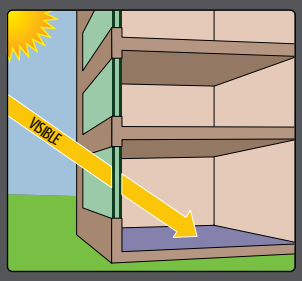
Dual-pane or "standard" insulating glass units (IGUs) provide four potential coating surfaces. The first (#1) surface faces outdoors; the fourth (#4) faces directly indoors. The two surfaces inside the IGU, which face each other and are separated by an airspace and an insulating spacer, are referred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



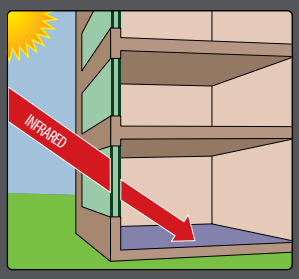
Magnetron-sputtered vacuum deposition (MSVD) coatings, or "soft" coats, such as *Solarban*® solar control low-e coatings, must be glazed within the IGU on the second (#2) or third (#3) surface.

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

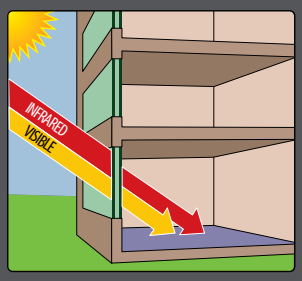
The energy performance of architectural glass is measured according to four critical factors:



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.

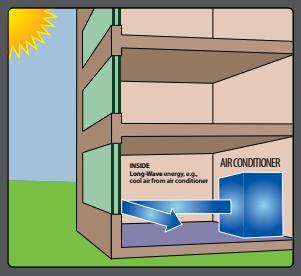


2. **Solar heat gain coefficient (SHGC)** quantifies the amount of solar energy (heat) that passes directly into a building through the glass. Glasses with the lowest SHGCs block the highest percentage of solar heat. In a 1-inch IGU, *Starphire*® glass has an SHGC of 0.82, which means it blocks only 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.

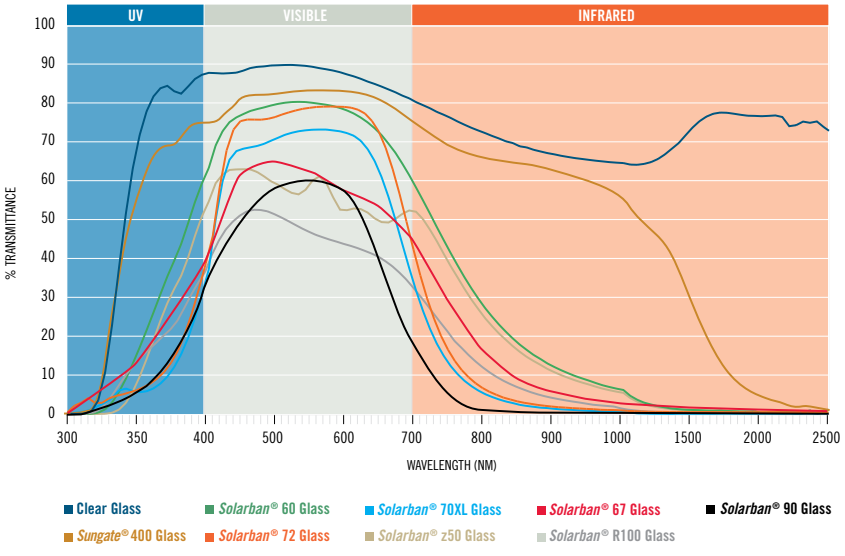
Solarban® 70XL glass

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.

SOLARBAN®
Solar Control Low-E 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/*Optiblue*® 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

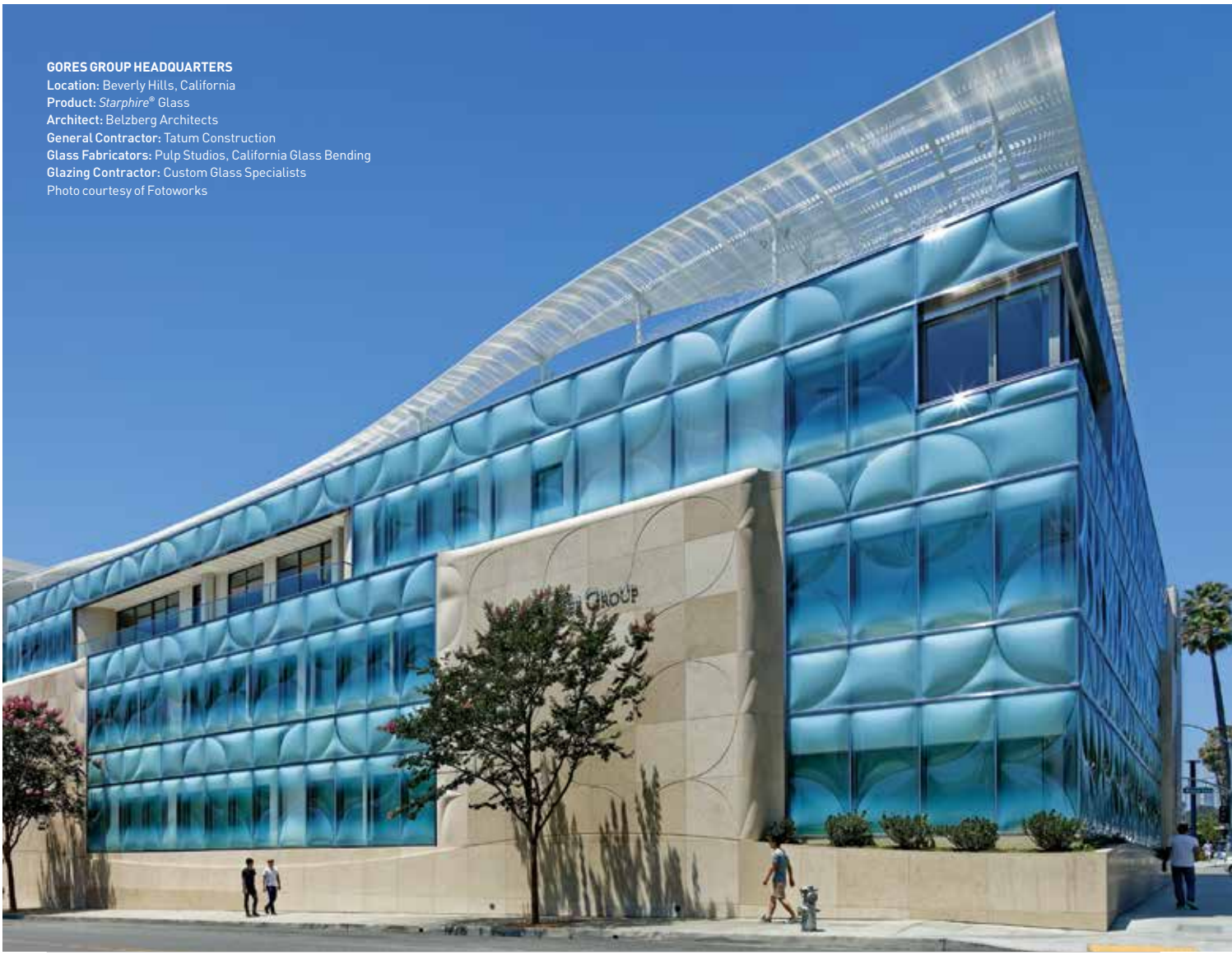
Starphire Ultra-Clear™ glass represents the ultimate achievement in highly transparent low-iron glass technology and is the benchmark in the industry. Vitro Glass makes *Starphire*® glass in a variety of thicknesses for vision glass, safety and security glass, point-fixed glazing, and other specialty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

STARPHIRE ULTRA-CLEAR™ GLASS | 25 Years 1990-2015

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

UNIVERSITY OF SOUTH FLORIDA, INTERDISCIPLINARY SCIENCE TEACHING AND RESEARCH FACILITY
Location: Tampa, Florida
Products: *Solarban*® 70XL/ *Solexia*® and *Optiblue*® Glasses; *Solarban*® 60/*Solexia*® and *Solexia*® Glasses
Architect: HOK
Glass Fabricator: Tecnoglass
Glazing Contractor: West Tampa Glass

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.*

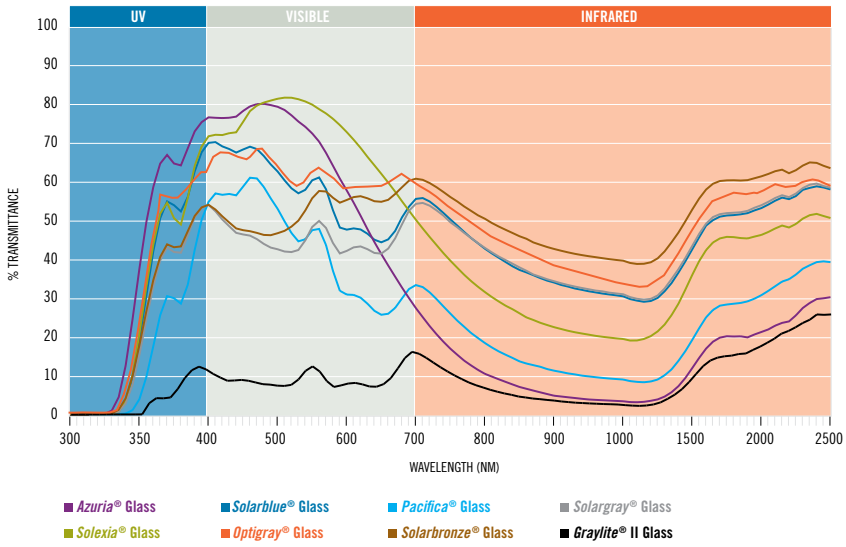
SOLARBLUE® glass features a sparkling, light sky-blue tint that balances high VLT of 50 percent with an SHGC of 0.49.*

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™ NETWORK

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·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									
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								
Glass Type Outdoor Lite: Coating if Any (Surface) Glass + 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		
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								
Glass Type Outdoor Lite: Coating if Any (Surface) Glass + 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® 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) Clear	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
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							
Glass Type Outdoor Lite: Coating if Any (Surface) Glass + 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.

Glass Specification Tools

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Covering glass topics, glass FAQs and a complete industry glossary, the site features a compelling mix of instructive video shorts, colorful illustrations and educational features that address issues such as preventing thermal glass breakage, specifying large insulating glass units and understanding how low-e glass works.

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

Glass colors represented in this brochure are approximate and reflect the effects of ambient lighting conditions as well as the photographic and lithographic processes.

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