




Together, We See Further



# Together, we can build brighter, bolder, more sustainable buildings.

## **Building a Brighter Tomorrow**

Vitro has been influencing skylines around the world for more than a century with signature architectural glass products that define today's most iconic buildings. The strength of our partnerships with architects, building owners, contractors and glass fabricators drives our desire to innovate and create solutions for today's challenges that deliver high design, energy efficiency and cost effectiveness. We employ thousands of dedicated team members who are defining the future of glass thanks to countless advancements in glass technology and production.

## **Focused on Sustainability**

At Vitro, we're committed to remaining a pioneer in glass technology, especially when it comes to delivering products that meet and exceed today's standards for sustainability. From the development of proprietary oxygen-fueled glass furnace technology, which cuts natural gas consumption by 15%, to continual advancements in magnetron sputtered vacuum deposition (MSVD) coatings, Vitro glass products offer opportunities to lower not just operational carbon but embodied carbon, as well.

# Meet Vitro

Vitro Architectural Glass, North America's largest and most trusted glass manufacturer, is responsible for many of the commercial glass industry's most commonly specified products, including high-performance *Solarban*® low-emissivity (low-e) glasses, *Starphire Ultra-Clear*® glass and a range of performance-tinted glasses.

Throughout its history, Vitro Glass has continually established and exceeded glass industry standards for solar control, color neutrality and both optical and spectral performance. In that time, Vitro has registered more than 500 patents. Today, the Vitro Glass Technology Center, located just outside Pittsburgh, Pennsylvania, employs about 200 people who remain committed to the future of glass.

As a global company focused on glass for a range of markets, Vitro is committed to innovation, sustainable manufacturing and energy-efficient end-use. By working closely with customers and partners, Vitro provides expert service and support to ensure your projects meet or exceed ever-evolving certifications and expectations.

## Realizing the Power of Partnership

At Vitro, we know the source of true success lies in the strength of our partnerships. With a foundation formed on trust, teamwork and shared excitement, the possibilities for impactful innovations in glass truly are endless.

Whether you're working with one of our National Architectural Managers or any other Vitro representative, we're proud to go above and beyond, serving as a true partner to give you an edge.

Learn more at [vitro.com/further](http://vitro.com/further)

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## DESIGN SPOTLIGHT

# Introducing *VacuMax*<sup>™</sup> Vacuum Insulating Glass (VIG)

Add Extraordinary Insulation to Any Configuration.

Thanks to its innovative insulating technology, *VacuMax*<sup>™</sup> VIG provides thermal insulation performance that is two to four times better than conventional insulating glass units and up to 14 times better than monolithic glass. With its extraordinary R-values, *VacuMax*<sup>™</sup> VIG delivers energy savings and reduced carbon emissions due to decreased HVAC use and subsequent Btu usage, and the unit's slim construction and light weight allows it to be incorporated into virtually any traditional glazing system, window frame or curtainwall application.

## Performance Benefits

Tempered *VacuMax*<sup>™</sup> VIG units are made up of two lites of 4mm (0.16") glass. Surface #2 on the interior lite includes a double-silver, low-e coating similar to *Solarban*<sup>®</sup> 60 solar control, low-e glass, and the lites are separated by a non-lead ed proprietary metal seal and a vacuum space.

*VacuMax*<sup>™</sup> VIG units are available in sizes from 0.30m x 0.30m (12" x 12") to 1.47m x 2.44m (58" x 96"). The entire VIG unit has a total thickness of 8.3mm (0.33"), only slightly thicker than a standard 6mm (0.24") glass lite.

For added versatility, tempered *VacuMax*<sup>™</sup> VIG units can be used as a substitute for the interior lite in any double- or triple-glazed insulating glass unit (IGU), where it forms an insulating gas space in addition to a vacuum insulating cavity and creates a hybrid IGU that delivers an R-value of R16+.

**With wall-like  
center of glass  
R-values of  
14+, *VacuMax*<sup>™</sup>  
VIG delivers  
the ultimate in  
thermal insulation  
performance.**

**VacuMax**<sup>™</sup>  
Vacuum Insulating Glass

Learn more at [VacuMaxVIG.com](http://VacuMaxVIG.com)

## Built for the Long Term

With its proprietary metal alloy edge seal system, *VacuMax*<sup>™</sup> VIG has exceptionally long life compared to other VIG products and delivers superior resistance against thermal expansion or contraction caused by extreme indoor/outdoor temperature differences.

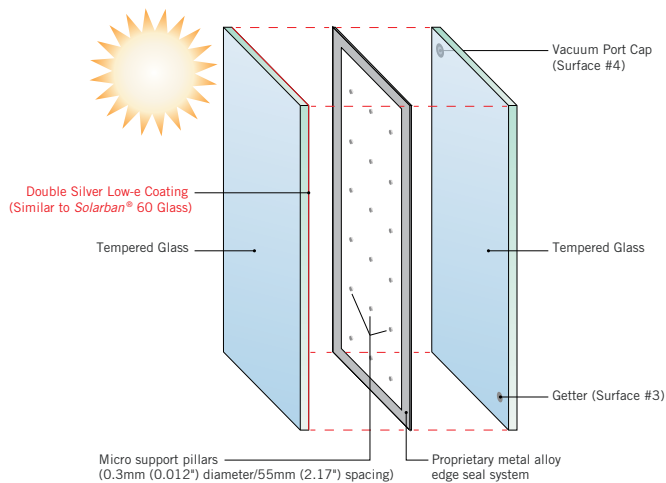
## Improved Acoustics & Condensation Performance

*VacuMax*<sup>™</sup> VIG also delivers increased acoustic performance for dramatic noise dampening plus reduced center of glass condensation at temperatures as low as -58 °F.

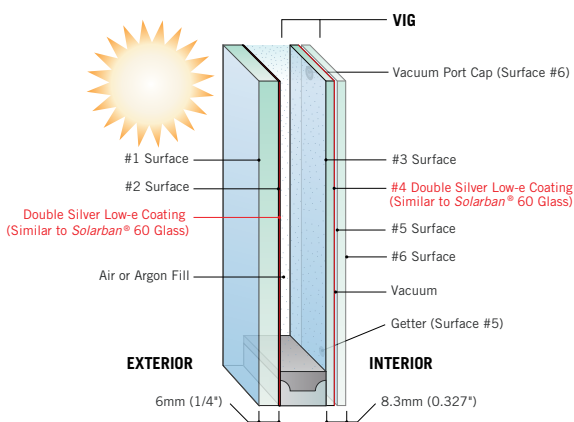
## Perfect for a Range of Applications

*VacuMax*<sup>™</sup> VIG is an ideal solution for any commercial or residential renovation or new construction project requiring extraordinary insulating performance, including office buildings, educational institutions, hospitality and healthcare.

### R14+ VIG



### R16+ Nominal 1" Hybrid IGU



## Solarvolt<sup>™</sup> Building Integrated Photovoltaic (BIPV) Glass System

Vitro's legacy of sustainability continues with the *Solarvolt*<sup>™</sup> BIPV glass system. Seamlessly integrated into the building structure, *Solarvolt*<sup>™</sup> BIPV glass unveils new possibilities for renewable power generation and design. *Solarvolt*<sup>™</sup> BIPV glass combines aesthetics, CO<sub>2</sub>-free power generation and protection from the elements for commercial buildings.



## An Integrated Building Envelope Solution

*Solarvolt*<sup>™</sup> BIPV glass systems replace traditional façade cladding materials, such as stone or ceramic materials, and enhance just about any part of commercial building exteriors, including balustrades and balconies, skylights, spandrel glass, roof elements, canopies and more. Upon request, *Solarvolt*<sup>™</sup> BIPV glass can become components of many traditional façade solutions.

Vitro manufactures customizable lites, including popular glass-glass composite solar panels with solar cells arranged between two glass lites, as well as glass substrate lites in sizes 2,500mm x 3,700mm (98.4" x 145.6") and in thicknesses up to two 10mm (0.39") lites.



Learn more at [VitroSolarvolt.com](http://VitroSolarvolt.com)

**HCA Office**

**Product**  
Solarban® R100 Glass

**Page 10**

**Location**  
Nashville, Tennessee — USA

**Architect**  
Gresham Smith

**Vitro Certified® Fabricator**  
Cristacurva

**Glazing Contractor**  
McInerney & Associates, Inc.

**Photography:** Tom Kessler



**University of Texas at Austin  
The Moody Center**

**Products**

Solarban® 70\* Glass  
Solarban® 70 Solargray® Glass

Pages 9 & 25

**Location**

Austin, Texas — USA

**Architect**

Gensler

**Vitro Certified® Fabricator**

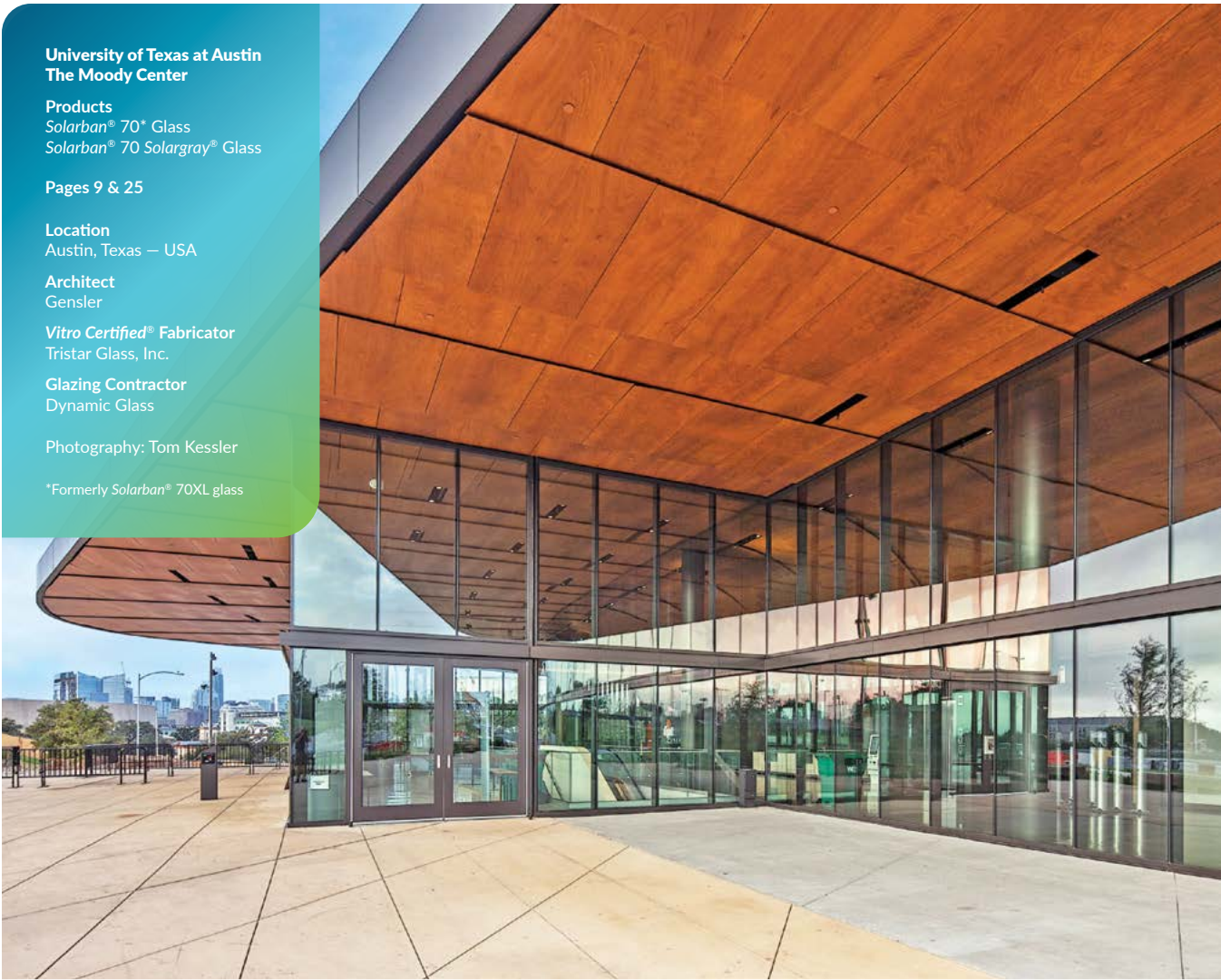
Tristar Glass, Inc.

**Glazing Contractor**

Dynamic Glass

Photography: Tom Kessler

\*Formerly Solarban® 70XL glass



**Gonzaga University  
Health Sciences and  
Innovation Building**

**Products**

Solarban® 90 Acuity® Glass

Pages 9 & 25

**Location**

Spokane, Washington — USA

**Architect**

CollinsWoerman

**Vitro Certified® Fabricator**

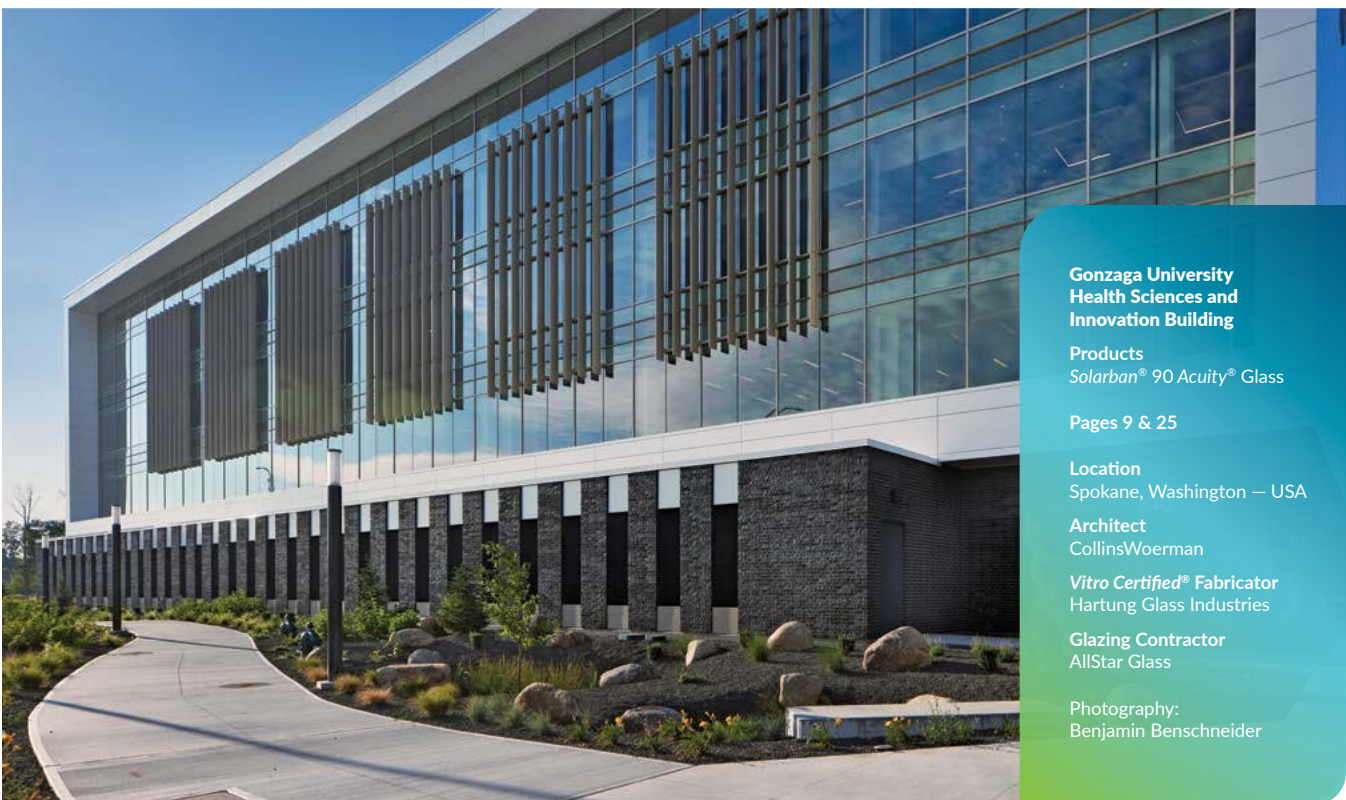
Hartung Glass Industries

**Glazing Contractor**

AllStar Glass

Photography:

Benjamin Benschneider





## VIA 57 West

**Product**  
Solarban® 70\* Glass

Page 9

**Location**  
New York, New York — USA

**Architect**  
Bjarke Ingels Group

**Glass Fabricator**  
Tecnoglass, S.A.

**Glazing Contractor**  
Enclos

**Curtain Wall Designer  
& Fabricator**  
Enclos

Photography: Tom Kessler

\*Formerly Solarban® 70XL glass

## Preserving Views. Conserving Energy.

At VIA 57 West—an audacious, shape-shifting structure on the bank of New York City's Hudson River—5,000 floor-to-ceiling windows in an array of shapes and sizes incorporate Solarban® 70\* glass, contributing to an integrated energy management program that incorporates a highly efficient mechanical system, occupancy sensors for lighting and a hybrid water source heat pump system. World-renowned firm Bjarke Ingels Group (BIG) was intent on specifying a product with a high-performing solar heat gain coefficient (SHGC) while preserving quality views.



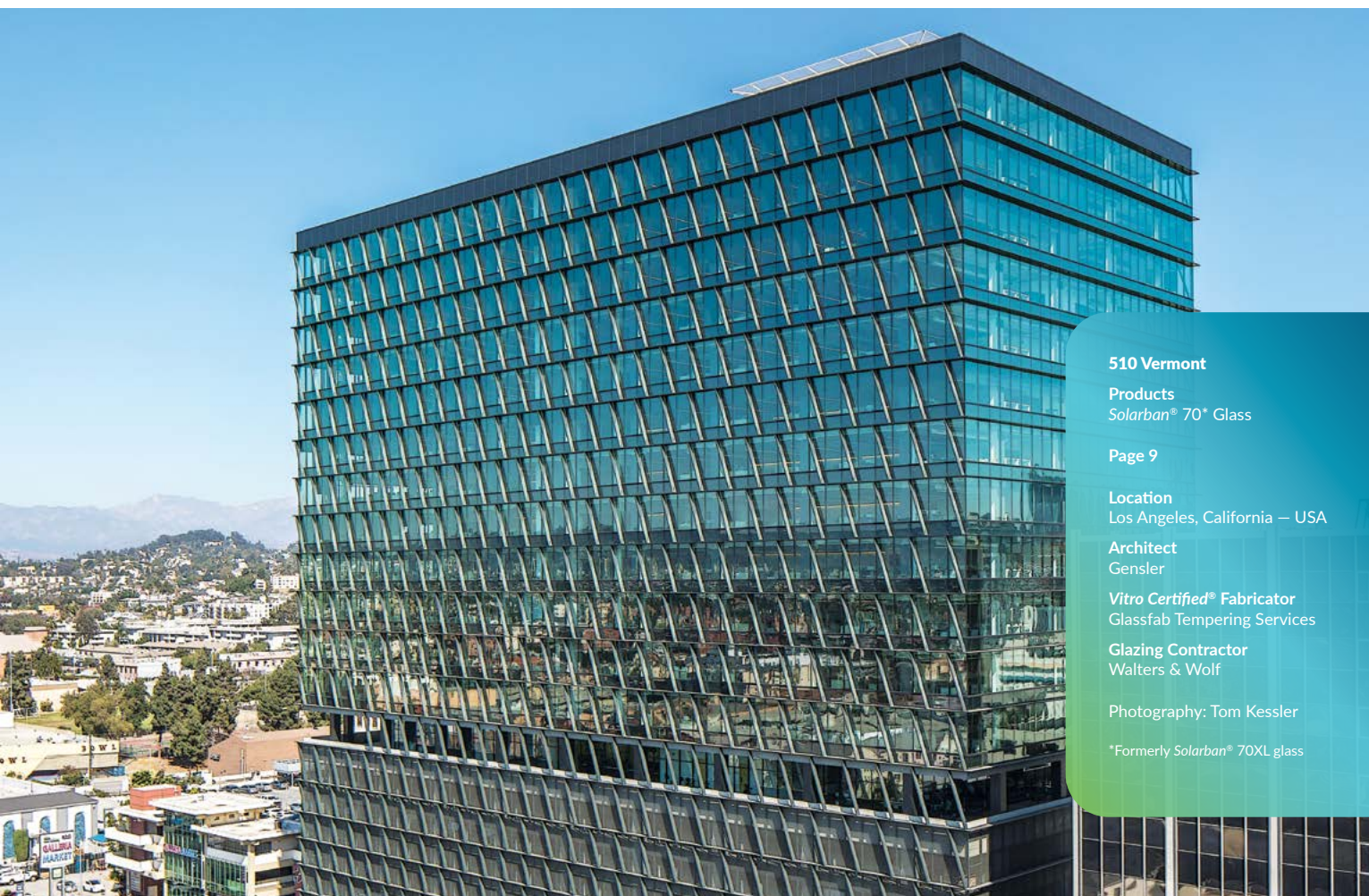
# Solarban® Solar Control Low-e Glass

When you want to maximize energy efficiency and lower operational carbon to meet today's sustainability standards without sacrificing aesthetics, the *Solarban®* brand of solar control low-e glasses by Vitro Architectural Glass offers unparalleled choices to help you achieve both your energy performance and design objectives.

Trusted by architects for half a century, you can rely on *Solarban®* glass to keep occupants comfortable and to realize your boldest visions. Best of all, *Solarban®* glass products can be combined with a wide array of low-iron or tinted glass options by Vitro for customized performance and aesthetic effects.

## Possibilities, Expanded

North America's largest oversized glass coater is located at our Wichita Falls, Texas, plant. That means *Solarban®* low-e glasses are available in oversized standard sizes of 3.30m x 5.18m (130" x 204"), as well as our Titan glass products that allow for sizes up to 3.30m x 6.10m (130" x 240").



### 510 Vermont

Products  
*Solarban®* 70\* Glass

Page 9

Location  
Los Angeles, California — USA

Architect  
Gensler

*Vitro Certified®* Fabricator  
Glassfab Tempering Services

Glazing Contractor  
Walters & Wolf

Photography: Tom Kessler

\*Formerly *Solarban®* 70XL glass

## EPIC 1

**Product**  
Solarban® 90 Starphire® Glass

**Location**  
Dallas, Texas — USA

**Architect**  
Perkins + Will

**Vitro Certified® Fabricator**  
Oldcastle BuildingEnvelope®

**Glazing Contractor**  
Harmon

Photography: Tom Kessler



## A NEW MEASURE OF PERFORMANCE

### Solarban® 90 Glass

**Aesthetic:** Neutral, similar to clear glass

**Reflectivity:** Low

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.

| 1-Inch IGU on Clear (2) | Substrate Options |     |       |          |        |
|-------------------------|-------------------|-----|-------|----------|--------|
|                         | SHGC              | VLT | Clear | Low-Iron | Tinted |
|                         | 0.23              | 51% | ✓     | ✓        | ✓      |

Data is based on center-of-glass performance, in a one-inch IGU with clear glass, 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.

## Biblioteca TEC Campus Monterrey

**Product**  
Solarban® 90 Glass

**Location**  
Monterrey,  
Nuevo León — Mexico

**Architect**  
Sasaki Associates  
RDLP Arquitectos  
GLR Arquitectos

**Vitro Certified® Fabricator**  
Vidrios El Castillo

**Glazing Contractor**  
VICRION



### HIGH-PERFORMANCE & NEUTRAL

## Solarban® 70\* Glass

(Formerly Solarban® 70XL glass)

**Aesthetic:** Neutral

**Reflectivity:** Low

Backed by a coating that architects have trusted for more than a decade, Solarban® 70\* glass, a technological breakthrough in solar control low-e glass, offers a balanced combination of visible light transmittance (VLT), solar control and clarity.

| 1-Inch IGU |     | Substrate Options |          |        |  |
|------------|-----|-------------------|----------|--------|--|
| SHGC       | VLT | Clear             | Low-Iron | Tinted |  |
| 0.27       | 64% | ✓                 |          | ✓      |  |

\* Vitro has changed the name of Solarban® 70XL glass to Solarban® 70 glass, formally dropping the "XL."

### EXCEPTIONALLY TRANSPARENT

## Solarban® 72 Glass

**Aesthetic:** Exceptionally transparent

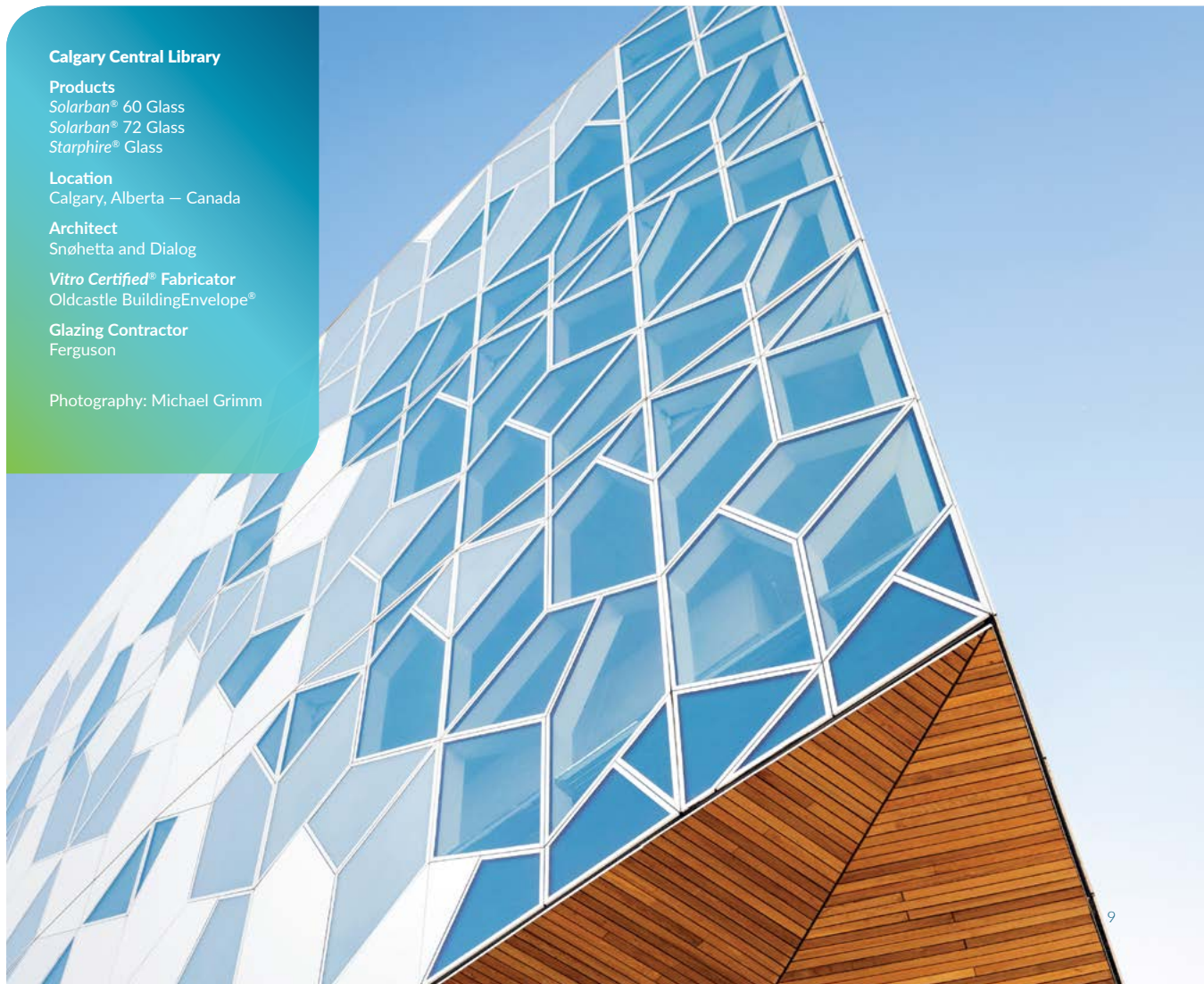
**Reflectivity:** Low

Solarban® 72 glass builds on the advances of Solarban® 70\* glass to provide even greater levels of transparency and color neutrality with minimal sacrifice of solar control performance. Available on Starphire Ultra-Clear® glass or Acuity® low-iron glass.

| 1-Inch IGU on Starphire® (2) |     | Substrate Options |          |        |  |
|------------------------------|-----|-------------------|----------|--------|--|
| SHGC                         | VLT | Clear             | Low-Iron | Tinted |  |
| 0.28                         | 68% |                   | ✓        |        |  |

| 1-Inch IGU on Acuity® (2) |     | Substrate Options |          |        |  |
|---------------------------|-----|-------------------|----------|--------|--|
| SHGC                      | VLT | Clear             | Low-Iron | Tinted |  |
| 0.28                      | 66% |                   | ✓        |        |  |



**Calgary Central Library**

**Products**

- Solarban® 60 Glass
- Solarban® 72 Glass
- Starphire® Glass

**Location**

Calgary, Alberta — Canada

**Architect**

Snøhetta and Dialog

**Vitro Certified® Fabricator**

Oldcastle BuildingEnvelope®

**Glazing Contractor**

Ferguson

Photography: Michael Grimm



**Four Constitution Square**

**Product**  
*Solarban® 60 Optiblue®\* Glass*  
*Solarban® R100 Glass*  
*Solarban® 60 Starphire® Glass*

**Location**  
 Washington,  
 District of Columbia – USA

**Architect**  
 HOK

**Vitro Certified® Fabricator**  
 Olcastle BuildingEnvelope®

**Glazing Contractor**  
 Physical Security LLC

Photography: Tom Kessler

\*Formerly *Solarban® z50 glass*

**VERSATILE NEUTRALITY**

*Solarban® 60 Glass*

**Aesthetic:** Clear, color-neutral

**Reflectivity:** Low

*Solarban® 60 glass* features a clear, color-neutral appearance that is available on clear glass, low-iron glass or any Vitro tinted glass for a wide array of aesthetic choices.

| 1-Inch IGU on Clear (2) |     | Substrate Options |          |        |
|-------------------------|-----|-------------------|----------|--------|
| SHGC                    | VLT | Clear             | Low-Iron | Tinted |
| 0.39                    | 70% | ✓                 | ✓        | ✓      |

**NEUTRAL-REFLECTIVE**

*Solarban® R77 Glass*

**Aesthetic:** Crisp, neutral

**Reflectivity:** Moderate

*Solarban® R77 glass* offers reflectivity that is higher than *Solarban® R67 glass* but lower than *Solarban® R100 glass*. With its balanced, reflective quality, it is ideal for façade and curtainwall designs intended to capture the visual character of the sky and ambient environment.

| 1-Inch IGU on Clear (2) |     | Substrate Options |          |        |
|-------------------------|-----|-------------------|----------|--------|
| SHGC                    | VLT | Clear             | Low-Iron | Tinted |
| 0.25                    | 47% | ✓                 | ✓        | ✓      |

**NEUTRAL-REFLECTIVE**

*Solarban® R67 Glass*

(Formerly *Solarban® 67 Glass*)

**Aesthetic:** Crisp, neutral

**Reflectivity:** Moderate

*Solarban® R67 glass* combines excellent solar control performance with a neutral coating that endows commercial buildings with a crisp, clean and soft reflective exterior appearance.

| 1-Inch IGU on Clear (2) |     | Substrate Options |          |        |
|-------------------------|-----|-------------------|----------|--------|
| SHGC                    | VLT | Clear             | Low-Iron | Tinted |
| 0.29                    | 54% | ✓                 | ✓        | ✓      |

**NEUTRAL-REFLECTIVE**

*Solarban® R100 Glass*

**Aesthetic:** Cool blue-gray

**Reflectivity:** High

*Solarban® R100 glass* is a neutral-reflective low-e glass with excellent solar performance and light transmittance.

| 1-Inch IGU on Clear (2) |     | Substrate Options |          |        |
|-------------------------|-----|-------------------|----------|--------|
| SHGC                    | VLT | Clear             | Low-Iron | Tinted |
| 0.23                    | 42% | ✓                 | ✓        | ✓      |

**OPTIMIZED FOR OPTIBLUE® GLASS**

*Solarban® 60 Optiblue® Glass*  
(Formerly *Solarban® z50 Glass*)

**Aesthetic:** Neutral, cool blue-gray

**Reflectivity:** Low

With its soothing, neutral, steel blue-gray appearance, *Solarban® 60 Optiblue®* glass brings a distinctly different aesthetic to the *Solarban® 60* glass family, along with minimal exterior reflectance, superb solar control and high levels of VLT.

| 1-Inch IGU with Clear |     | Substrate Options |          |        |
|-----------------------|-----|-------------------|----------|--------|
| SHGC                  | VLT | Clear             | Low-Iron | Tinted |
| 0.32                  | 51% |                   |          | ✓      |

**OPTIMIZED FOR OPTIBLUE® GLASS**

*Solarban® 70 Optiblue® Glass*  
(Formerly *Solarban® z75 Glass*)

**Aesthetic:** Soft silver-blue

**Reflectivity:** Low

With its cool blue-gray appearance and ample VLT, *Solarban® 70 Optiblue®* glass excels at controlling glare while offering superior solar control.

| 1-Inch IGU with Clear |     | Substrate Options |          |        |
|-----------------------|-----|-------------------|----------|--------|
| SHGC                  | VLT | Clear             | Low-Iron | Tinted |
| 0.23                  | 46% |                   |          | ✓      |

**FAST Transit Center**

**Products**  
*Solarban® R67\* Glass*

**Location**  
Fayetteville, North Carolina — USA

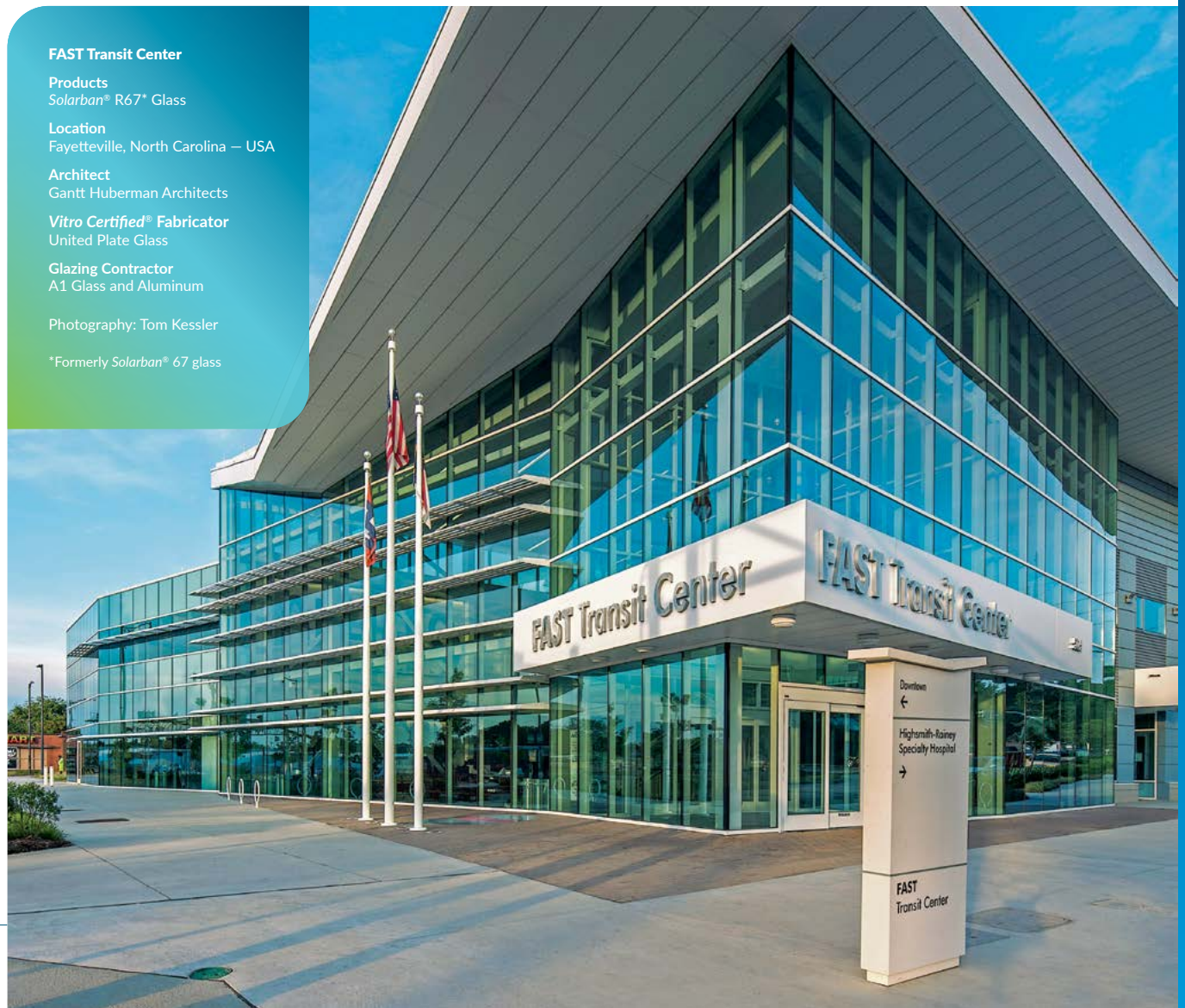
**Architect**  
Gantt Huberman Architects

**Vitro Certified® Fabricator**  
United Plate Glass

**Glazing Contractor**  
A1 Glass and Aluminum

Photography: Tom Kessler

\*Formerly *Solarban® 67 glass*

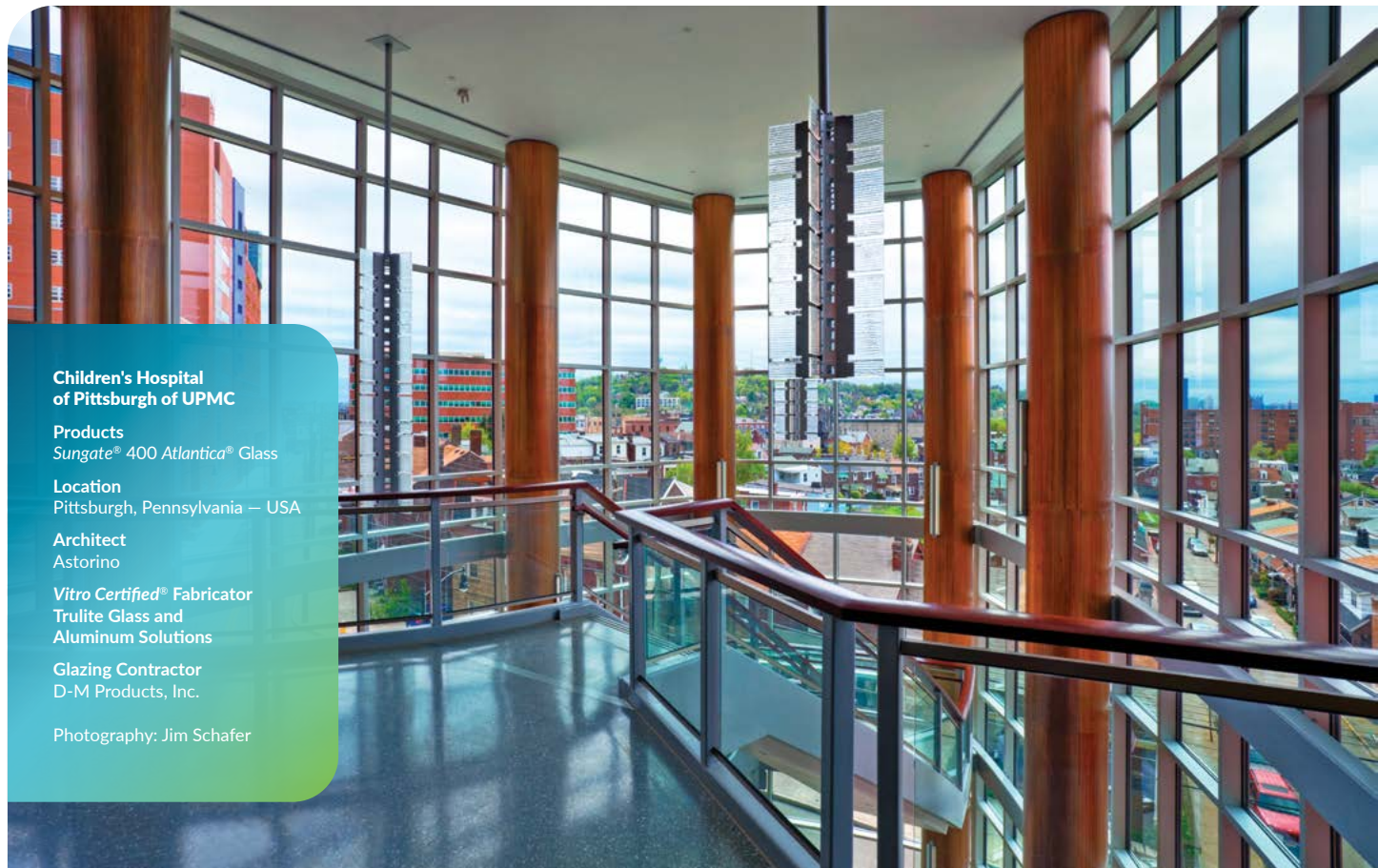


# Sungate® 400 Passive Low-E Glass

Sungate® 400 glass is a highly transparent, passive low-e glass designed specifically for use in heating-dominated climates. Manufactured with a magnetron sputtered vacuum deposition (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 glass delivers a winter U-value that is 9% lower than passive low-e glasses manufactured with a “hard” pyrolytic coating. Sungate® 400 glass also has been engineered to work with Solarban® 70 (formerly Solarban® 70XL glass) and Solarban® 60 glasses to optimize performance in triple-pane IGUs.

| 1-Inch IGU on Clear (3) |     | Substrate Options |          |        |  |
|-------------------------|-----|-------------------|----------|--------|--|
| SHGC                    | VLT | Clear             | Low-Iron | Tinted |  |
| 0.60                    | 76% | ✓                 | ✓        |        |  |

**SUNGATE® 400**  
Low-E Glass



**Children's Hospital  
of Pittsburgh of UPMC**

**Products**  
Sungate® 400 Atlantica® Glass

**Location**  
Pittsburgh, Pennsylvania — USA

**Architect**  
Astorino

**Vitro Certified® Fabricator**  
Trulite Glass and  
Aluminum Solutions

**Glazing Contractor**  
D-M Products, Inc.

Photography: Jim Schafer



**The Boulevard Club**

**Products**  
Solarban® 60 Starphire® Glass  
AviProtek® Bird-Friendly Glass  
by Walker Glass

**Pages 11 & 15**

**Location**  
Toronto, Ontario – Canada

**Architect**  
Teepie Architects

**Vitro Certified® Fabricator**  
Trulite Glass and  
Aluminum Solutions

**Acid-Etched  
Pattern Manufacturer**  
Walker Glass

**Photography:** Philip Castleton

**Oklahoma University  
College of Medicine**

**Products**  
Solarban® R100 Solargray® Glass  
Solarban® 72 Starphire® Glass

**Pages 9, 10, 15 & 25**

**Location**  
Oklahoma City, Oklahoma – USA

**Architects**  
Bockus Payne Associates  
Architecture

**Vitro Certified® Fabricator**  
Tristar Glass Inc.

**Glazing Contractor**  
Oak Cliff Mirror &  
Glass Company Inc.

**Photography:** Randy Alvarado



**University of Kansas  
Medical Center Health  
Education Building**

**Product**  
Solarban® 70\* Glass  
Solarban® 72 Starphire® Glass

Pages 9 & 15

**Location**  
Kansas City, Kansas — USA

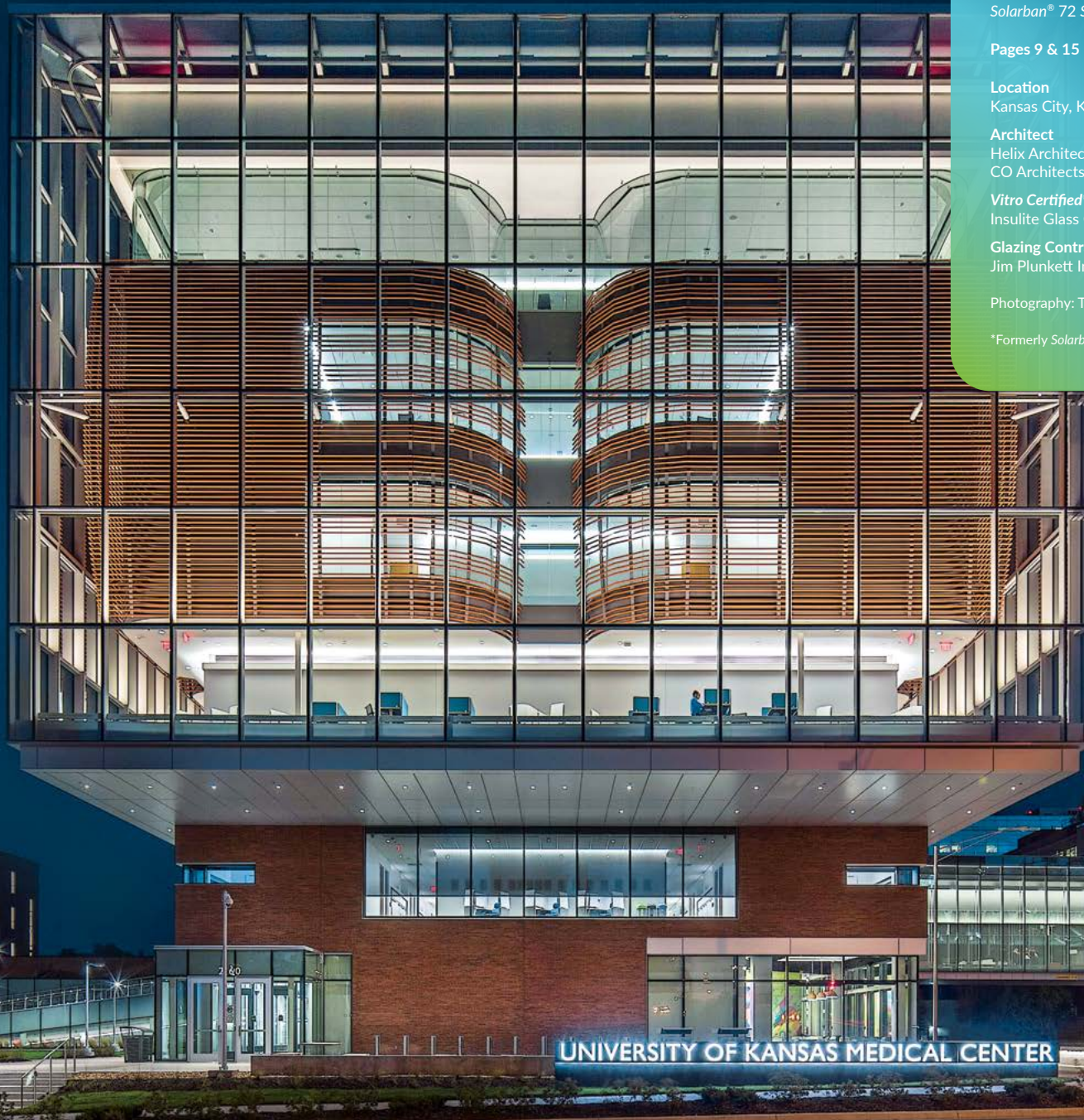
**Architect**  
Helix Architecture + Design  
CO Architects

**Vitro Certified® Fabricator**  
Insulite Glass Co.

**Glazing Contractor**  
Jim Plunkett Incorporated

Photography: Tom Kessler

\*Formerly Solarban® 70XL glass



## Anatomy of a Lantern

Balancing the use of glass, metal and brick to create an iconic presence on campus, the University of Kansas Medical Center Health Education Building features a four-story glass “lantern” box design glazed with Solarban® 70\* glass. Flexible learning studios and state-of-the-art labs float within the box to showcase the building’s curriculum to the public. A glass-enclosed bridge featuring Solarban® 72 Starphire® glass passes through the center of the structure and connects it to adjacent buildings.

The exceptional clarity of the glass met Helix Architecture + Design’s and CO Architects’ requirements for transparency, connectivity and identity. A three-story skylight system that allows ventilation between floors is supplemented by an energy-efficient glass configuration featuring Solarban® 70\* glass, which limits heat gain while enhancing occupant comfort. A large cantilevered glass “cube” highlights the medical simulation and clinical skills floors at the “heart” of the building.



# Starphire Ultra-Clear® Glass

Brilliance and clarity that conventional clear glass can't match

## THE CLEAREST. THE ORIGINAL.

Offering pure, undistorted transmitted color, without the green hue inherent in conventional clear glass, *Starphire Ultra-Clear*® glass represents the ultimate achievement in highly transparent low-iron glass technology. As the benchmark in the industry, *Starphire*® glass is produced in a variety of thicknesses for vision glass, safety glass and security glass, point-fixed glazing and other specialty and decorative applications. *Starphire*® glass provides an unprecedented option for curtainwall glass applications, offering brilliant clarity, true-to-life views of the outdoors and vibrant colors that conventional coated, insulated or laminated glass simply can't match.

## EXTRA-HEAVY GLASS

*Starphire*® glass maintains its signature azure blue edge, clarity and true color transmittance even in increasing thicknesses or when laminated into multiple layers. Architects can specify *Starphire*® extra-heavy glass in thicknesses of up to 3/4-inch or 19 millimeters for heavy glass applications, such as entrances, storefronts and security glazing with unique designs for added visual interest.

APPEARANCE

**87%**  
Less Green  
than Clear Glass

PERFORMANCE

**7% ↑**  
Higher VLT  
than Clear Glass in  
1/2-Inch Thickness

PERFORMANCE

**16% ↑**  
Higher VLT  
than Clear Glass in  
1-3/8-Inch Laminate

  
**STARPHIRE**  
ULTRA-CLEAR® GLASS



### Amazon Spheres

Products  
*Solarban*® 60 *Starphire*® Glass

Page 10

Location  
Seattle, Washington — USA

Architect  
NBBJ

*Vitro Certified*® Fabricator

Glazing Contractor  
Enclos

Photography: Tom Kessler



**Apache Corporation**

**Products**  
Starphire® Glass

**Location**  
Calgary, Alberta — Canada

**Architect**  
utile

**Vitro Authorized™  
Starphire® Glass Partner**  
Goldray Glass

Photography: Bruce Damonte

**INTERIOR APPLICATIONS**

**Decorative Applications**

For sparkling clarity and visual excitement, Starphire® glass has no equal. The design possibilities are boundless with decorative Starphire® glass, which renders colors and patterns in their truest forms. Use Starphire® glass with a variety of techniques such as digital printing, dichroic lamination, acid etching and more — even on laminated or heavy glass — to create brilliant visuals.

**The Starphire® Glass Edge**

For interior applications where the glass edge is exposed — such as partitions, entrances, handrails and balustrades — Starphire® glass maintains its signature azure blue edge, even at lengths of 3.30m (130") and thicknesses of 19mm (0.75") Review the Starphire® Edge Color Guide at vitroglazings.com for more information.

**Functional Beauty**

Starphire® glass provides a unique combination of performance and visual impact ideal for functional pieces such as doors, partitions, stairs and handrails. For security applications, Starphire® glass can be tempered or laminated for safety and extra strength — while still delivering unparalleled color transmission.

**UCSF Medical Center**

**Products**  
Solarban® 70\* Glass  
Starphire® Glass

**Location**  
San Francisco, California — USA

**Architect**  
Stantec Architecture  
Taylor Design

**Vitro Certified® Fabricator**  
Glassfab Tempering Services Inc.

**Vitro Authorized™  
Starphire® Glass Partner**  
Skyline Design

**Glazing Contractor**  
Enclos

Photography:  
Michael McLane Photography

\*Formerly Solarban® 70XL glass



## STUNNINGLY CLEAR AT ANY THICKNESS

### Monolithic Data

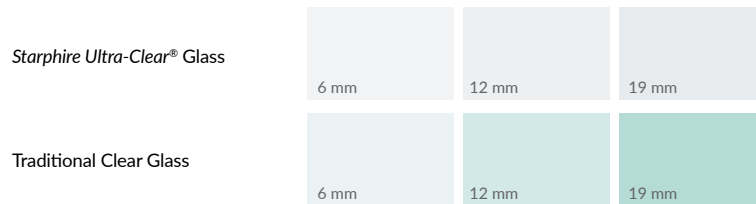
At any thickness, *Starphire Ultra-Clear®* glass transmits ample visible light to deliver visual excitement and create a sense of connectivity between spaces.

| Inches     | Millimeters | VLT |
|------------|-------------|-----|
| 1/8 to 3/8 | 3.2 to 10   | 91% |
| 1/2 to 3/4 | 12 to 19    | 90% |

## SURFACE COMPARISON

The surface clarity of *Starphire®* glass actually becomes more apparent as the glass gets thicker, maintaining its signature clear aesthetic.

The chart below demonstrates how the thickness of the glass at its center can affect the greenish hue of traditional clear float glass in comparison to *Starphire®* glass.



**No glazing product comes close to the clarity offered by *Starphire Ultra-Clear®* glass.**

To optimize transparent façades, curtainwalls, and commercial windows, specify *Starphire®* glass for a 2-4% improvement in VLT compared to coated conventional clear glass.



### University of Arizona Health Sciences Innovation Building (HSIB)

**Products**  
Solarban® 90 Glass  
Starphire® Glass

Pages 8, 15

**Location**  
Tucson, Arizona — USA

**Architect**  
CO Architects

**Glazing Contractor**  
Kovach

Photography: Jim Cunningham



### Jewel Changi Airport

**Products**  
Solarban® 70\* Glass  
Solarban® 72 Starphire® Glass

Pages 9, 11

**Location**  
Singapore – Malaysia

**Architect**  
Moshe Safdie Architects  
XRSP Architects, Planners and Engineers

**Vitro Certified® Global Fabricators**  
GnT Glass Company, Ltd.  
Wujiang Golden Glass Technologies

**Glazing Contractor**  
Mero Asia Pacific

Photography: thirtysixshots photography

\*Formerly Solarban® 70XL glass

**SAFE Credit Union  
Performing Arts Center**

**Products**  
*Solarban® 90 Acuity® Glass*

**Pages** 8, 19

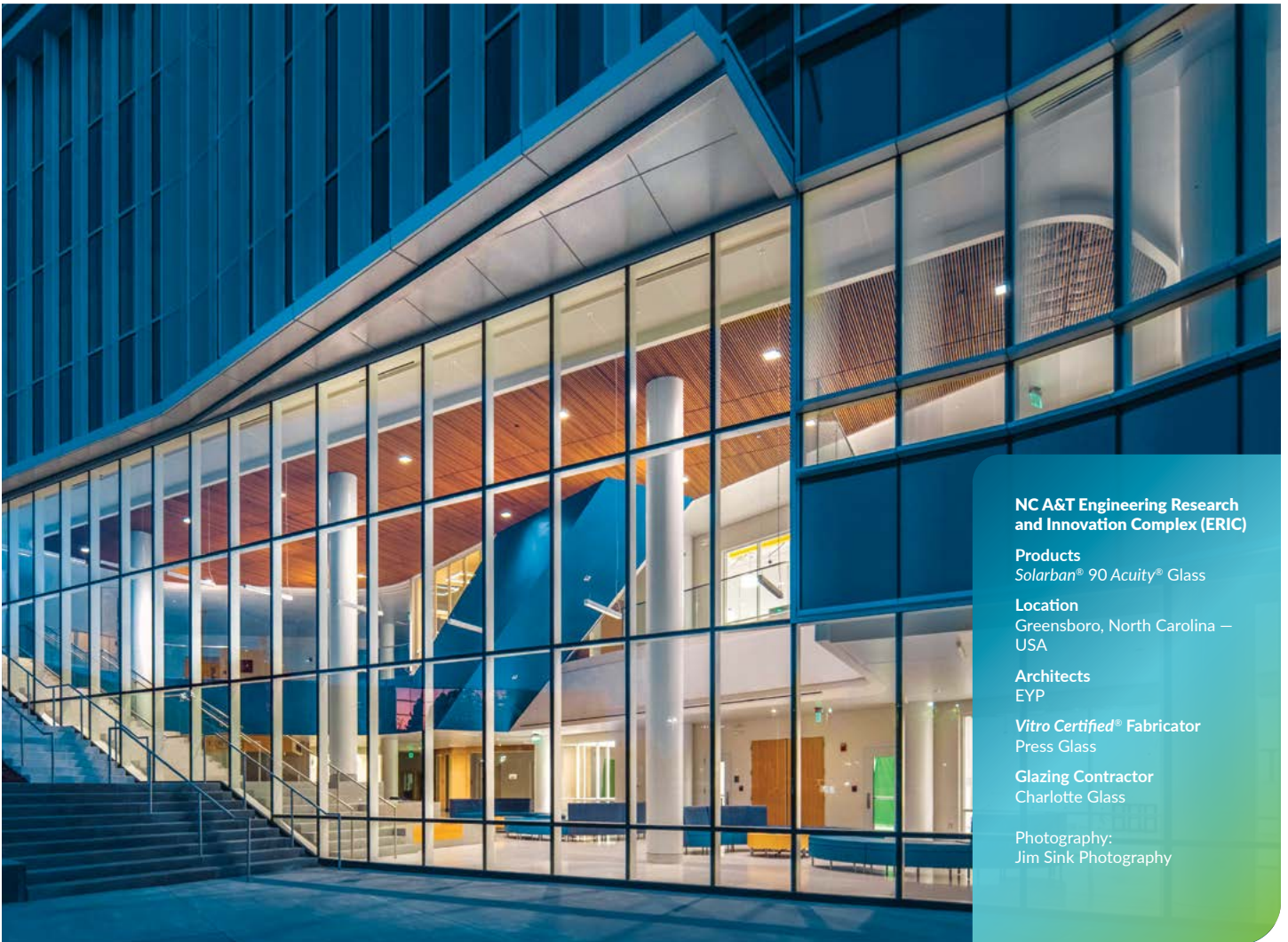
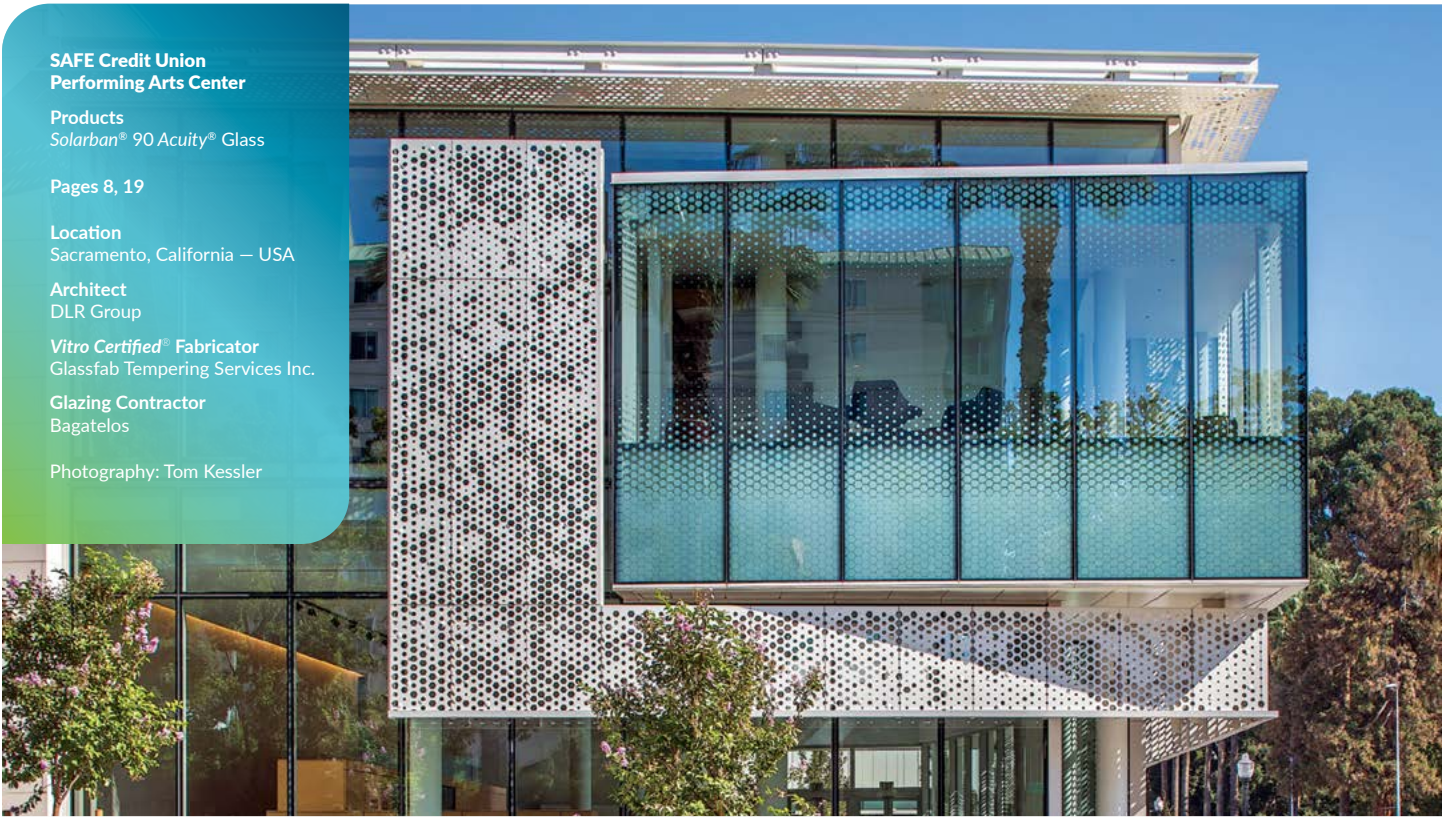
**Location**  
Sacramento, California — USA

**Architect**  
DLR Group

**Vitro Certified® Fabricator**  
Glassfab Tempering Services Inc.

**Glazing Contractor**  
Bagatelos

**Photography:** Tom Kessler



**NC A&T Engineering Research  
and Innovation Complex (ERIC)**

**Products**  
*Solarban® 90 Acuity® Glass*

**Location**  
Greensboro, North Carolina —  
USA

**Architects**  
EYP

**Vitro Certified® Fabricator**  
Press Glass

**Glazing Contractor**  
Charlotte Glass

**Photography:**  
Jim Sink Photography

# Acuity® Low-Iron Glass

**Elevate aesthetics for just a modest investment, without sacrificing performance.**

Where conventional clear glass was once a given – such as spandrel and vision glass applications – pure clarity is now within reach. Acuity® glass provides an affordable low-iron solution and joins Starphire® glass in the Vitro family of low-iron glass options. Available with all Solarban® solar control low-e coatings, Acuity® glass offers vivid views with minimal green cast.

When used with low-e coatings, Acuity® low-iron glass delivers a natural aesthetic, improves VLT by 1-4% and gives you the SHGCs you expect from Vitro high-performance glasses – all without compromising stringent project budgets.

**Acuity® glass is available in 6, 8 and 10 millimeter thicknesses.**

APPEARANCE

**60%**

**Less Green**

than Conventional Clear Glass



**Solarban® Acuity® glass is stocked at all Vitro facilities for immediate shipment with the same lead time as all Solarban® glass products. All configurations include uncoated Acuity® glass as the interior lite:**

**VERSATILE NEUTRALITY**

Solarban® 60 Acuity® Glass

| Solarban® 60 (2) Acuity® + Acuity® |      |     |
|------------------------------------|------|-----|
|                                    | SHGC | VLT |
|                                    | 0.41 | 73% |

**SOFT & NEUTRAL**

Solarban® R67\* Acuity® Glass

| Solarban® R67 (2) Acuity® + Acuity® |      |     |
|-------------------------------------|------|-----|
|                                     | SHGC | VLT |
|                                     | 0.30 | 56% |

\*Formerly Solarban® 67 glass

**EXCEPTIONALLY TRANSPARENT**

Solarban® 72 Acuity® Glass

| Solarban® 72 (2) Acuity® + Acuity® |      |     |
|------------------------------------|------|-----|
|                                    | SHGC | VLT |
|                                    | 0.28 | 67% |

**NEUTRAL-REFLECTIVE**

Solarban® R77 Acuity® Glass

| Solarban® R77 (2) Acuity® + Acuity® |      |     |
|-------------------------------------|------|-----|
|                                     | SHGC | VLT |
|                                     | 0.25 | 49% |

**A NEW MEASURE OF PERFORMANCE**

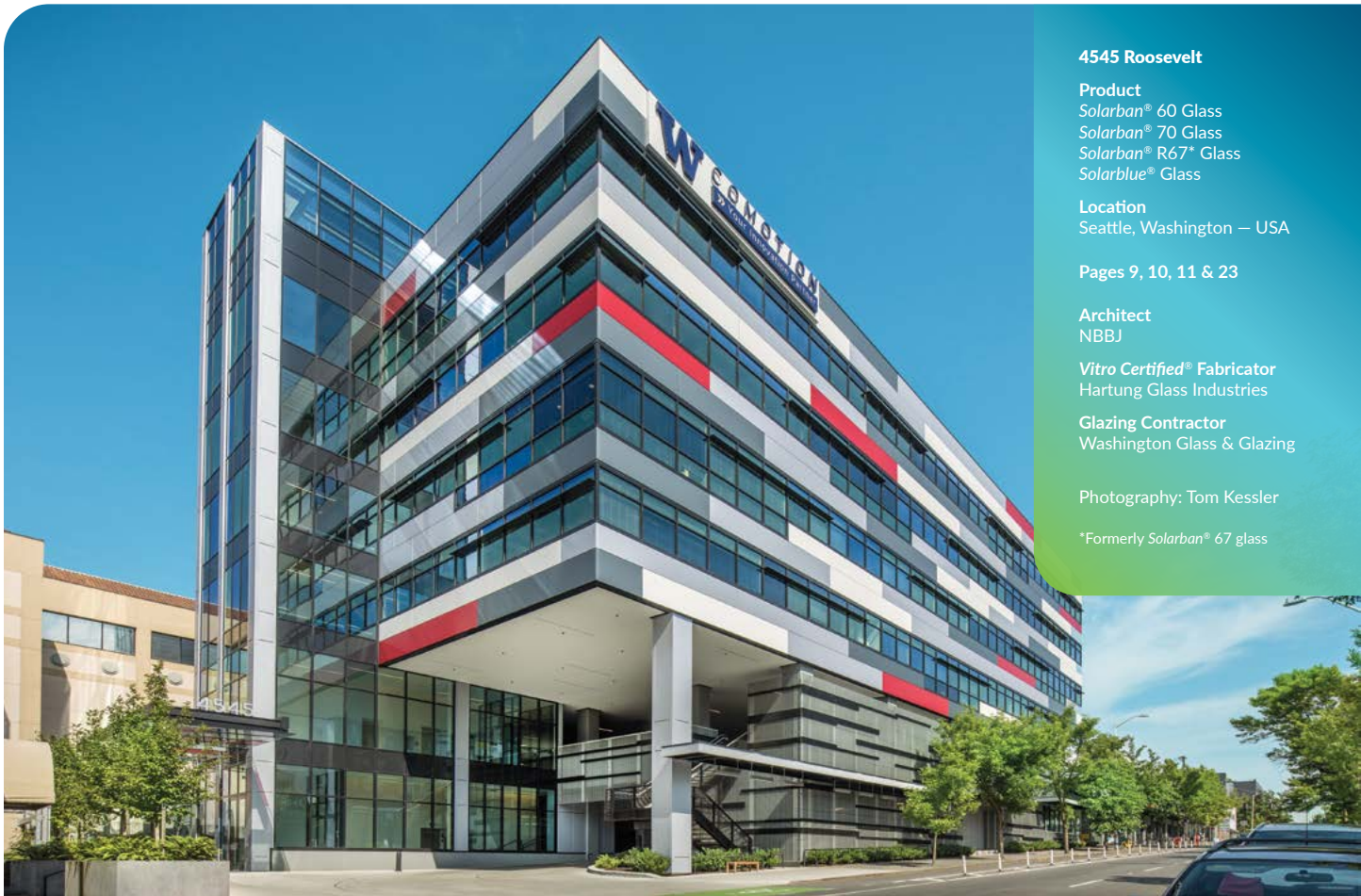
Solarban® 90 Acuity® Glass

| Solarban® 90 (2) Acuity® + Acuity® |      |     |
|------------------------------------|------|-----|
|                                    | SHGC | VLT |
|                                    | 0.23 | 53% |

**NEUTRAL-REFLECTIVE**

Solarban® R100 Acuity® Glass

| Solarban® R100 (2) Acuity® + Acuity® |      |     |
|--------------------------------------|------|-----|
|                                      | SHGC | VLT |
|                                      | 0.23 | 43% |



**4545 Roosevelt**

**Product**

Solarban® 60 Glass  
Solarban® 70 Glass  
Solarban® R67\* Glass  
Solarblue® Glass

**Location**

Seattle, Washington — USA

Pages 9, 10, 11 & 23

**Architect**

NBBJ

**Vitro Certified® Fabricator**

Hartung Glass Industries

**Glazing Contractor**

Washington Glass & Glazing

Photography: Tom Kessler

\*Formerly Solarban® 67 glass



**UCI Middle Earth  
Housing Expansion**

**Products**

Solarban® R67\* Solexia® Glass

**Location**

Irvine, California — USA

Pages 10 & 23

**Architect**

Mithun

**Vitro Certified® Fabricator**

Northwestern Industries, Inc.

**Glazing Contractor**

Kovach Building Enclosures

Photography: Tom Kessler

\*Formerly Solarban® 67 glass



**Daimler Trucks  
North America Headquarters**  
Products  
*Solarban® R100 Solarblue® Glass*

Pages 10 & 23

Location  
Portland, Oregon — USA

Architect  
Ankrom Moisan Architects

*Vitro Certified®* Fabricator  
Hartung Glass Industries

Glazing Contractor  
Benson Industries

Photography: Tom Kessler

## A Pickup in Energy Efficiency

Daimler Trucks North America Corporate Headquarters, featuring *Solarban® R100* glass on performance-tinted *Solarblue®* glass, is a testament to energy efficiency. In fact, so much so that the U.S. Green Building Council (USGBC) awarded the building LEED Platinum certification — the agency's highest rating — and ENERGY STAR® scored the building at 99 out of 100 possible points, an achievement that only 1% of office buildings nationwide can assert. *Solarban® R100* on *Solarblue®* glass was integral to the design strategy executed by Ankrom Moisan Architects, who used the demands of the building's interior workplaces to guide its overall structure. Combined in a standard one-inch IGU, the glasses deliver VLT of 26% and a SHGC of 0.19.

# Blue & Green Performance-Tinted Glasses

## A SEA OF NAUTICALLY INSPIRED TINTS

Vitro Glass offers a broad portfolio of blue and green performance tints that imbue buildings with exceptionally natural, environment-blending colors. While most of these glasses are spectrally selective in a one-inch IGU with clear glass, they can dramatically lower solar heat loads with *Solarban*<sup>®</sup> low-e glass coatings and provide unique solutions.

## LIGHT-BODIED BLUE

Designed to complement *Solarban*<sup>®</sup> glasses, *Optiblue*<sup>®</sup> glass is a light-bodied, neutral color tint that optimizes the performance and aesthetics of *Solarban*<sup>®</sup> glass coatings as substrates. *Optiblue*<sup>®</sup> glass provides *Solarban*<sup>®</sup> 60 with *Optiblue*<sup>®</sup> (formerly *Solarban*<sup>®</sup> z50) and *Solarban*<sup>®</sup> 70 with *Optiblue*<sup>®</sup> (formerly *Solarban*<sup>®</sup> z75) glasses with their cool-neutral appearance. Combining *Optiblue*<sup>®</sup> glass with *Solarban*<sup>®</sup> 90 glass in a standard one-inch IGU results in a 0.20 SHGC and a VLT of 37%.

## AQUA-BLUE HARMONY

### Azuria<sup>®</sup> Glass

**Aesthetic:** Aqua-blue

**Reflectivity:** Low

Aqua-blue *Azuria*<sup>®</sup> glass offers an exterior reflectance similar to clear glass with VLT of 50% and a low SHGC of 0.24 when coated with *Solarban*<sup>®</sup> 70 glass in a one-inch IGU.

| 1-Inch IGU with <i>Solarban</i> <sup>®</sup> 70 (2) |                               |     |
|---|-------------------------------|-----|
|   | SHGC                          | VLT |
|   | 0.24                          | 50% |
| Coating Options                                     |                               |     |
| Low-e   | Reflective                    |     |
| <i>Solarban</i> <sup>®</sup>                        | <i>Solarcool</i> <sup>®</sup> |     |



### 167 West Erie

**Products**  
*Solarban*<sup>®</sup> 60 *Solarblue*<sup>®</sup> Glass

### Page 11

**Location**  
Chicago, Illinois — USA

**Architect**  
bKL Architecture

**Vitro Certified<sup>®</sup> Fabricator**

**Glazing Contractor**  
Reflection Window + Wall

Photography: Tom Kessler



**Mission College**

**Products**  
Solarban® 60 Solarblue® Glass

**Page 11**

**Location**  
Santa Clara, California — USA

**Vitro Certified® Fabricator**  
Glassfab Tempering Services Inc.

**Glazing Contractor**  
Walters & Wolf



**A PLEASANT GREEN**

*Atlantica®* Glass

**Aesthetic:** Emerald-green

**Reflectivity:** Low

*Atlantica®* glass is an emerald-green glass that delivers a SHGC of 0.23 while maintaining 49% VLT when coated with *Solarban®* 70 glass in a one-inch IGU.

| 1-Inch IGU with <i>Solarban®</i> 70 (2) |      | Coating Options |                  |            |
|---|------|-----------------|------------------|------------|
|   | SHGC | VLT             | Low-e            | Reflective |
|   | 0.23 | 49%             | <i>Solarban®</i> | NA         |

**SOOTHING LIGHT-GREEN**

*Solexia®* Glass

**Aesthetic:** Light green

**Reflectivity:** Low

*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.

| 1-Inch IGU with <i>Solarban®</i> 70 (2) |      | Coating Options |                  |            |
|---|------|-----------------|------------------|------------|
|   | SHGC | VLT             | Low-e            | Reflective |
|   | 0.26 | 56%             | <i>Solarban®</i> | NA         |

**SPARKLING LIGHT-BLUE**

*Solarblue®* Glass

**Aesthetic:** Light sky-blue

**Reflectivity:** Low

*Solarblue®* glass features a sparkling, light sky-blue tint that balances high VLT of 41% with a SHGC of 0.22 when coated with *Solarban®* 70 glass in a one-inch IGU.

| 1-Inch IGU with <i>Solarban®</i> 70 (2) |      | Coating Options |                  |                   |
|---|------|-----------------|------------------|-------------------|
|   | SHGC | VLT             | Low-e            | Reflective        |
|   | 0.22 | 41%             | <i>Solarban®</i> | <i>Solarcool®</i> |

**DEEP BLUE**

*Pacifica®* Glass

**Aesthetic:** Deeply saturated true-blue

**Reflectivity:** Low

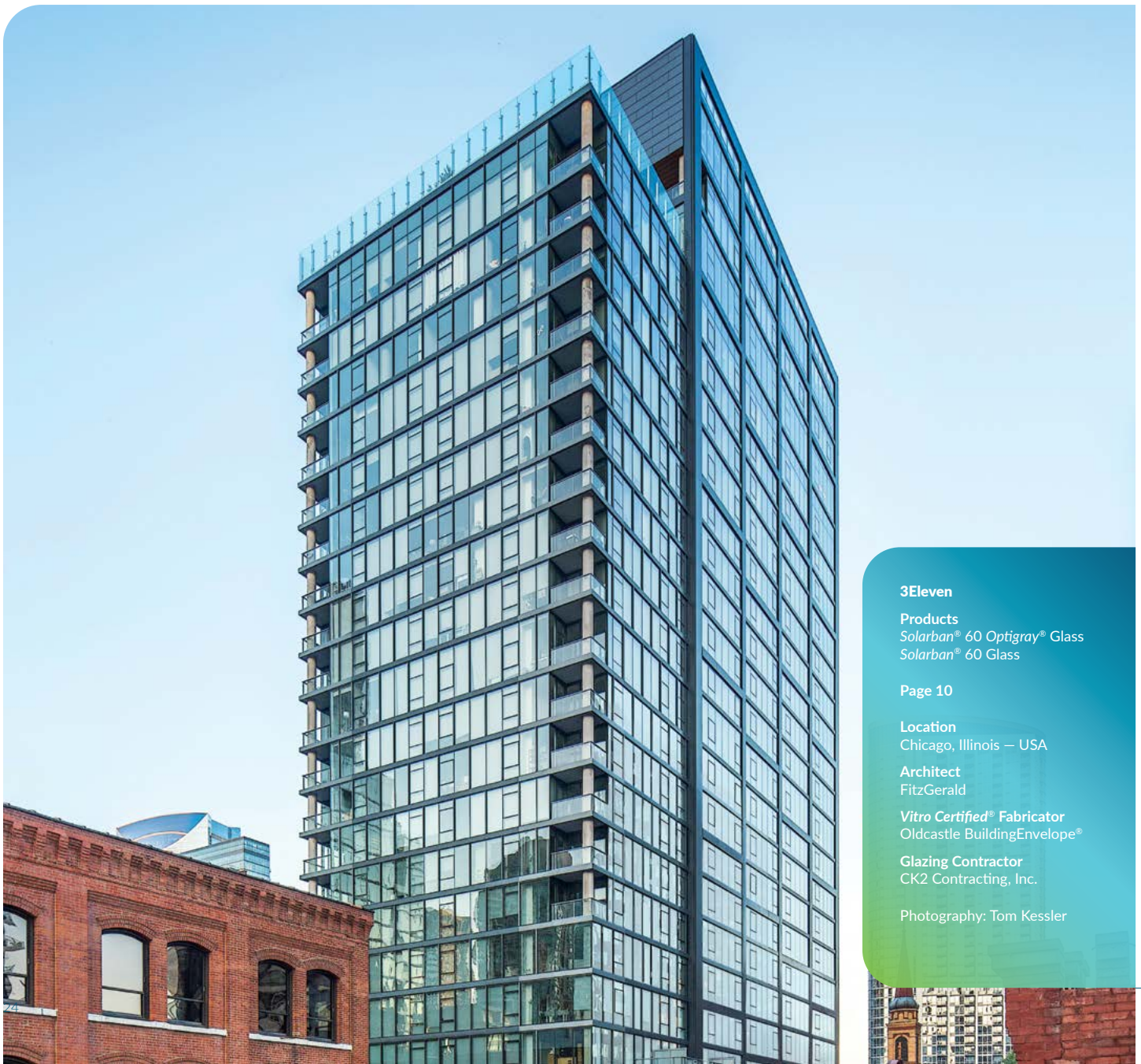
*Pacifica®* glass is a deeply saturated true-blue tint with a SHGC of 0.19 and VLT of 31% when coated with *Solarban®* 70 glass in a one-inch IGU.

| 1-Inch IGU with <i>Solarban®</i> 70 (2) |      | Coating Options |                  |                   |
|---|------|-----------------|------------------|-------------------|
|   | SHGC | VLT             | Low-e            | Reflective        |
|   | 0.19 | 31%             | <i>Solarban®</i> | <i>Solarcool®</i> |

# Gray & Bronze Performance-Tinted Glasses

## FROM WARM NEUTRALS TO PRIVACY GLASS

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*® low-e glass coatings for optimum performance.



### 3Eleven

**Products**  
*Solarban*® 60 Optigray® Glass  
*Solarban*® 60 Glass

Page 10

**Location**  
Chicago, Illinois – USA

**Architect**  
FitzGerald

**Vitro Certified® Fabricator**  
Oldcastle BuildingEnvelope®

**Glazing Contractor**  
CK2 Contracting, Inc.

Photography: Tom Kessler



**Rolex**  
**Products**  
 Solarban® R67 Optigray® Glass

**Page 10**

**Location**  
 Dallas, Texas — USA

**Architect**  
 Kengo Kuma and Associates  
 HDF Architects

**Vitro Certified® Fabricator**  
 Tristar Glass, Inc.

**Photography:** Tom Kessler

\*Formerly Solarban® 67 glass

**ULTRA-NEUTRAL GRAY**

*Optigray®* Glass

**Aesthetic:** Warm light gray

**Reflectivity:** Low

*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.

| 1-Inch IGU with Solarban® 70 (2) |      | Coating Options |           |            |
|----------------------------------|------|-----------------|-----------|------------|
|                                  | SHGC | VLT             | Low-e     | Reflective |
|                                  | 0.23 | 46%             | Solarban® | NA         |

**A CLASSIC NEUTRAL**

*Solargray®* Glass

**Aesthetic:** Cool medium gray

**Reflectivity:** Low

*Solargray®* glass has a cool medium-gray appearance with a classic, neutral aesthetic favored by many designers and maintains VLT of 32% in a one-inch IGU with *Solarban®* 70 glass.

| 1-Inch IGU with Solarban® 70 (2) |      | Coating Options |           |            |
|----------------------------------|------|-----------------|-----------|------------|
|                                  | SHGC | VLT             | Low-e     | Reflective |
|                                  | 0.19 | 32%             | Solarban® | Solarcool® |

**A RICH CONTRAST**

*Graylite®* II Glass

**Aesthetic:** Dark gray

**Reflectivity:** Low

*Graylite®* II glass delivers a rich dark-gray aesthetic, glare control and distinctive color contrast when paired with a Vitro low-e glass in a one-inch IGU.

| 1-Inch IGU with Solarban® 70 (3) |      | Coating Options |           |            |
|----------------------------------|------|-----------------|-----------|------------|
|                                  | SHGC | VLT             | Low-e     | Reflective |
|                                  | 0.11 | 6%              | Solarban® | NA         |

**WARM, HARMONIZING BRONZE**

*Solarbronze®* Glass

**Aesthetic:** Warm bronze

**Reflectivity:** Low

*Solarbronze®* glass offers a warm bronze appearance that complements a range of hues from adjacent building materials and still offers VLT of 39% in a one-inch IGU with *Solarban®* 70 glass.

| 1-Inch IGU with Solarban® 70 (2) |      | Coating Options |           |            |
|----------------------------------|------|-----------------|-----------|------------|
|                                  | SHGC | VLT             | Low-e     | Reflective |
|                                  | 0.20 | 39%             | Solarban® | Solarcool® |

Data is based on center-of-glass performance, in a one-inch IGU with clear glass, 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.



**Gateway Corporate Center**

**Product**  
Vistacool® Azuria® Glass

**Page 28**

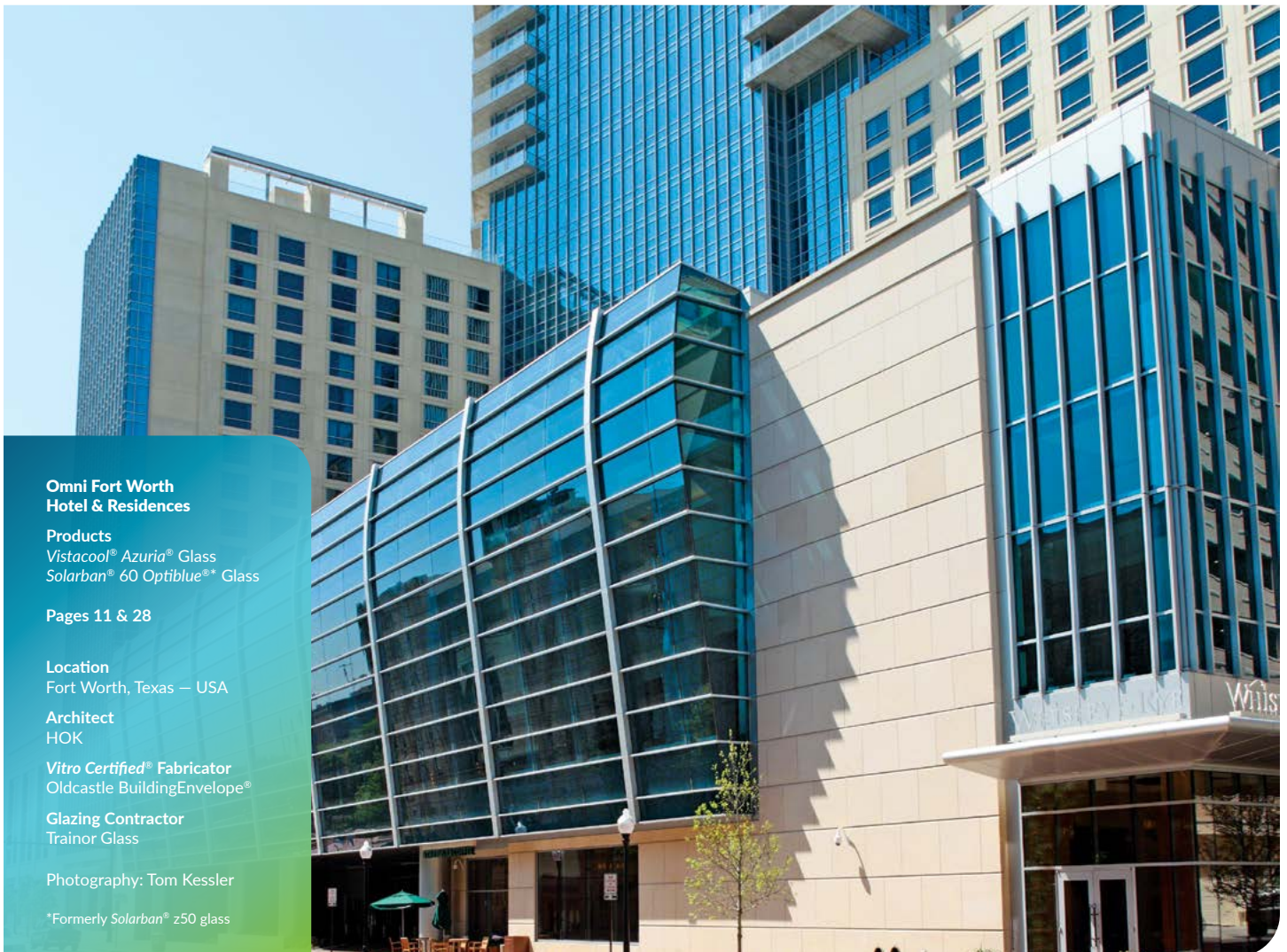
**Location**  
Dallas, Texas — USA

**Architect**  
O'Brien + Associates

**Vitro Certified® Fabricator**  
Trulite Glass and Aluminum  
Solutions

**Glazing Contractor**  
B+B Glass

**Photography:** Wes Thompson



**Omni Fort Worth  
Hotel & Residences**

**Products**  
Vistacool® Azuria® Glass  
Solarban® 60 Optiblue®\* Glass

**Pages 11 & 28**

**Location**  
Fort Worth, Texas — USA

**Architect**  
HOK

**Vitro Certified® Fabricator**  
Oldcastle BuildingEnvelope®

**Glazing Contractor**  
Trainer Glass

**Photography:** Tom Kessler

\*Formerly Solarban® z50 glass

**Sky Las Vegas****Product**

*Vistacool® Azuria® Glass*  
*Solarban® 60 Clear Glass*

**Pages 11 & 28****Location**

Las Vegas, Nevada — USA

**Architect**

Klai Juba Architects

**Vitro Certified® Fabricator**

Oldcastle BuildingEnvelope®

**Glazing Contractor**

Heinaman Contract Glazing

Photography: Tom Kessler

## Striking Jackpot

As one of the first luxury high-rises on Las Vegas Boulevard, Sky Las Vegas is distinguished by its striking blue glass exterior. Central to this aesthetic is 92,000 square-feet of *Vistacool® Azuria®* glass, featuring a proprietary *Vistacool®* color-enriched coating that subtly reflects *Azuria®* glass' stunning aqua-blue tint. Despite the color-richness, the configuration delivers VLT of 42% with an exceptional SHGC of 0.26 in a one-inch IGU. By blocking more than 70% of the sun's heat energy, *Vistacool® Azuria®* glass with *Solarban® 60* glass not only enhances the comfort of residents but also lowers their air-conditioning and lighting costs.

# Vistacool® Subtly Reflective Color-Enriched Glasses

The Vistacool® family of subtly reflective, color-enriched glasses is engineered to deliver high levels of 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 – Azuria® glass for an aqua-blue appearance or Pacifica® glass for a true-blue appearance – that may be combined with Solarban® or Sungate® low-e glass coatings.

## RICH, AQUA-BLUE

### Vistacool® Azuria® Glass

| Vistacool® (2) Azuria® + Solarban® 60 (3) |      |                      |     |
|---|------|----------------------|-----|
|   | SHGC | Exterior Reflectance | VLT |
|   | 0.26 | 20%                  | 42% |

## DEEP, TRUE-BLUE

### Vistacool® Pacifica® Glass

| Vistacool® (2) Pacifica® + Solarban® 60 (3) |      |                      |     |
|---|------|----------------------|-----|
|   | SHGC | Exterior Reflectance | VLT |
|   | 0.22 | 11%                  | 26% |



#### Baker Hughes

##### Products

Vistacool® Pacifica® Glass  
Solarban® 60 Glass  
Solarban® 70\* Glass

Pages 10, 11

##### Location

Houston, Texas – USA

##### Architect

Energy Architecture

Vitro Certified® Fabricator

##### Glazing Contractor

Duke Glass, Inc.

Photography: Duke Glass, Inc.

\*Formerly Solarban® 70XL glass

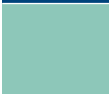
# Solarcool<sup>®</sup> Reflective Glasses

For more than 50 years, Vitro's proven and highly durable Solarcool<sup>®</sup> reflective coated glasses have enhanced the appearance of thousands of buildings and the comfort of occupants. When applied to the first (#1) surface of an IGU, Solarcool<sup>®</sup> glass produces a reflective, metallic sheen. On the second (#2) surface, Solarcool<sup>®</sup> coatings add reflectivity and enrich the color of five Vitro tinted glasses.

When combined in a one-inch IGU with Solarban<sup>®</sup> 60 glass, Solarcool<sup>®</sup> reflective glasses offer an expansive palette of appearance and performance options with SHGCs ranging from 0.15 to 0.18 and exterior reflectance of up to 19%.


## AQUA-BLUE

### Solarcool<sup>®</sup> Azuria<sup>®</sup> Glass

| Solarcool <sup>®</sup> (2) Azuria <sup>®</sup> + Solarban <sup>®</sup> 60 (3)       |      |                      |     |
|---|------|----------------------|-----|
|   | SHGC | Exterior Reflectance | VLT |
|  | 0.17 | 19%                  | 21% |


## WARM BRONZE

### Solarcool<sup>®</sup> Solarbronze<sup>®</sup> Glass

| Solarcool <sup>®</sup> (2) Solarbronze <sup>®</sup> + Solarban <sup>®</sup> 60 (3)  |      |                      |     |
|---|------|----------------------|-----|
|   | SHGC | Exterior Reflectance | VLT |
|  | 0.18 | 14%                  | 17% |


## RICH BLUE

### Solarcool<sup>®</sup> Pacifica<sup>®</sup> Glass

| Solarcool <sup>®</sup> (2) Pacifica <sup>®</sup> + Solarban <sup>®</sup> 60 (3)     |      |                      |     |
|---|------|----------------------|-----|
|   | SHGC | Exterior Reflectance | VLT |
|  | 0.15 | 10%                  | 13% |


## MEDIUM GRAY

### Solarcool<sup>®</sup> Solargray<sup>®</sup> Glass

| Solarcool <sup>®</sup> (2) Solargray <sup>®</sup> + Solarban <sup>®</sup> 60 (3)    |      |                      |     |
|---|------|----------------------|-----|
|   | SHGC | Exterior Reflectance | VLT |
|  | 0.17 | 11%                  | 14% |

## LIGHT SKY-BLUE

### Solarcool<sup>®</sup> Solarblue<sup>®</sup> Glass

| Solarcool <sup>®</sup> (2) Solarblue <sup>®</sup> + Solarban <sup>®</sup> 60 (3)    |      |                      |     |
|---|------|----------------------|-----|
|   | SHGC | Exterior Reflectance | VLT |
|  | 0.18 | 14%                  | 17% |

Data is based on center-of-glass performance, in a one-inch IGU with clear glass, 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.

## Monolithic Glass Comparison<sup>1</sup>

| Glass Thickness           |      | Visible Light Transmittance (VLT) <sup>2</sup> % | Visible Light Reflectance <sup>2</sup> |            | (Btu/hr·ft <sup>2</sup> ·°F) NFRC U-Value <sup>3</sup> |              | Solar Heat Gain Coefficient (SHGC) <sup>4</sup> | Light-to-Solar Gain (LSG) <sup>5</sup> |      |
|---------------------------|------|--|--|------------|--|--------------|---|--|------|
| Inches                    | mm   |  | Exterior %                             | Interior % | Winter Nighttime                                       | Winter Argon |   |  |      |
| Uncoated                  |      |  |  |            |  |              |   |  |      |
| <b>CLEAR Glass</b>        |      |  |  |            |  |              |   |  |      |
|                           | 1/8  | 3  | 90                                     | 9          | 9  | 1.04         | NA  | 0.86                                   | 1.05 |
|                           | 5/32 | 4  | 90                                     | 9          | 9  | 1.04         | NA  | 0.85                                   | 1.06 |
|                           | 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          | 8  | 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   | 82                                     | 8          | 8  | 0.97         | NA  | 0.69                                   | 1.19 |
|                           | 3/4  | 19   | 81                                     | 8          | 8  | 0.95         | NA  | 0.68                                   | 1.19 |
| <b>ACUITY® Glass</b>      |      |  |  |            |  |              |   |  |      |
|                           | 1/4  | 6  | 90                                     | 8          | 8  | 1.02         | NA  | 0.87                                   | 1.03 |
|                           | 5/16 | 8  | 90                                     | 8          | 8  | 1.01         | NA  | 0.86                                   | 1.05 |
|                           | 3/8  | 10   | 90                                     | 8          | 8  | 1.00         | NA  | 0.85                                   | 1.06 |
| <b>STARPHIRE® Glass</b>   |      |  |  |            |  |              |   |  |      |
|                           | 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 |
| <b>SOLEXIA® Glass</b>     |      |  |  |            |  |              |   |  |      |
|                           | 1/8  | 3  | 83                                     | 8          | 8  | 1.04         | NA  | 0.71                                   | 1.17 |
|                           | 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 |
| <b>ATLANTICA® Glass</b>   |      |  |  |            |  |              |   |  |      |
|                           | 1/4  | 6  | 67                                     | 7          | 7  | 1.02         | NA  | 0.53                                   | 1.26 |
| <b>AZURIA® Glass</b>      |      |  |  |            |  |              |   |  |      |
|                           | 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 |
| <b>SOLARBLUE® Glass</b>   |      |  |  |            |  |              |   |  |      |
|                           | 1/4  | 6  | 56                                     | 6          | 6  | 1.02         | NA  | 0.61                                   | 0.92 |
| <b>PACIFICA® Glass</b>    |      |  |  |            |  |              |   |  |      |
|                           | 1/4  | 6  | 42                                     | 5          | 5  | 1.02         | NA  | 0.49                                   | 0.86 |
| <b>SOLARBRONZE® Glass</b> |      |  |  |            |  |              |   |  |      |
|                           | 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 |
|                           | 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 |
| <b>OPTIGRAY® Glass</b>    |      |  |  |            |  |              |   |  |      |
|                           | 1/4  | 6  | 63                                     | 6          | 6  | 1.02         | NA  | 0.65                                   | 0.97 |
| <b>SOLARGRAY® Glass</b>   |      |  |  |            |  |              |   |  |      |
|                           | 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 |
|                           | 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 |
| <b>GRAYLITE® II Glass</b> |      |  |  |            |  |              |   |  |      |
|                           | 1/8  | 3  | 24                                     | 5          | 5  | 1.04         | NA  | 0.45                                   | 0.53 |
|                           | 5/32 | 4  | 18                                     | 4          | 5  | 1.04         | NA  | 0.42                                   | 0.43 |
|                           | 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 |



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

| Outdoor Lite:<br>Coating if Any<br>(Surface) Glass | Glass Type<br>+         | Indoor Lite:<br>Coating if Any<br>(Surface) Glass | Visible Light<br>Transmittance<br>(VLT) <sup>2</sup> % | Visible Light Reflectance <sup>2</sup> |            | (Btu/hr·ft <sup>2</sup> ·°F)<br>NFRC U-Value <sup>3</sup> |              | Solar Heat Gain<br>Coefficient<br>(SHGC) <sup>4</sup> | Color Rendering<br>Index (CRI) <sup>5</sup> |
|--|-------------------------|---|--|--|------------|---|--------------|---|---|
|  |                         |   |  | Exterior %                             | Interior % | Winter<br>Nighttime                                       | Winter Argon |   |   |
| <b>Uncoated</b>                                    |                         |   |  |  |            |   |              |   |   |
|  | CLEAR Glass + Clear     |   | 79   | 15                                     | 15         | 0.47  | 0.45         | 0.70  | 95  |
|  | ACUITY® + ACUITY®       |   | 82   | 15                                     | 15         | 0.47  | 0.45         | 0.78  | 98  |
|  | STARPHIRE® + STARPHIRE® |   | 84   | 15                                     | 15         | 0.47  | 0.45         | 0.82  | 99  |
|  | SOLEXIA® + Clear        |   | 69   | 13                                     | 15         | 0.47  | 0.45         | 0.50  | 86  |
|  | ATLANTICA® + Clear      |   | 60   | 10                                     | 14         | 0.47  | 0.45         | 0.40  | 84  |
|  | AZURIA® + Clear         |   | 61   | 11                                     | 14         | 0.47  | 0.45         | 0.39  | 77  |
|  | SOLARBLUE® + Clear      |   | 50   | 9                                      | 13         | 0.47  | 0.45         | 0.49  | 84  |
|  | PACIFICA® + Clear       |   | 38   | 7                                      | 13         | 0.47  | 0.45         | 0.36  | 72  |
|  | SOLARBRONZE® + Clear    |   | 47   | 8                                      | 13         | 0.47  | 0.45         | 0.51  | 95  |
|  | OPTIGRAY® + Clear       |   | 56   | 10                                     | 13         | 0.47  | 0.45         | 0.52  | 94  |
|  | SOLARGRAY® + Clear      |   | 40   | 7                                      | 13         | 0.47  | 0.45         | 0.46  | 93  |
|  | GRAYLITE® II + Clear    |   | 8  | 4                                      | 12         | 0.47  | 0.45         | 0.22  | 85  |
| <b>Coated</b>                                      |                         |   |  |  |            |   |              |   |   |

**SOLARBAN® 60 Solar Control Low-e Glass**

|  |                                       |    |    |    |      |      |      |    |
|--|---------------------------------------|----|----|----|------|------|------|----|
|  | SOLARBAN 60 (2) Clear + Clear         | 70 | 11 | 12 | 0.29 | 0.24 | 0.39 | 95 |
|  | SOLARBAN 60 (2) ACUITY + ACUITY       | 73 | 11 | 12 | 0.29 | 0.24 | 0.41 | 97 |
|  | SOLARBAN 60 (2) STARPHIRE + STARPHIRE | 74 | 11 | 12 | 0.29 | 0.24 | 0.41 | 98 |
|  | SOLARBAN 60 (2) SOLEXIA + Clear       | 61 | 9  | 12 | 0.29 | 0.24 | 0.32 | 90 |
|  | SOLARBAN 60 (2) ATLANTICA + Clear     | 53 | 8  | 11 | 0.29 | 0.24 | 0.27 | 86 |
|  | SOLARBAN 60 (2) AZURIA + Clear        | 54 | 8  | 11 | 0.29 | 0.24 | 0.28 | 78 |
|  | SOLARBAN 60 (2) SOLARBLUE + Clear     | 45 | 7  | 11 | 0.29 | 0.24 | 0.29 | 94 |
|  | SOLARBAN 60 (2) PACIFICA + Clear      | 34 | 6  | 10 | 0.29 | 0.24 | 0.23 | 86 |
|  | SOLARBAN 60 (2) SOLARBRONZE + Clear   | 42 | 7  | 11 | 0.29 | 0.24 | 0.28 | 95 |
|  | SOLARBAN 60 (2) OPTIGRAY + Clear      | 50 | 8  | 11 | 0.29 | 0.24 | 0.30 | 94 |
|  | SOLARBAN 60 (2) SOLARGRAY + Clear     | 35 | 6  | 10 | 0.29 | 0.24 | 0.25 | 95 |
|  | SOLEXIA + SOLARBAN 60 (3) Clear       | 61 | 10 | 10 | 0.29 | 0.24 | 0.37 | 88 |
|  | ATLANTICA + SOLARBAN 60 (3) Clear     | 53 | 8  | 10 | 0.29 | 0.24 | 0.31 | 84 |
|  | AZURIA + SOLARBAN 60 (3) Clear        | 54 | 9  | 10 | 0.29 | 0.24 | 0.31 | 77 |
|  | SOLARBLUE + SOLARBAN 60 (3) Clear     | 45 | 7  | 9  | 0.29 | 0.24 | 0.33 | 84 |
|  | PACIFICA + SOLARBAN 60 (3) Clear      | 34 | 6  | 9  | 0.29 | 0.24 | 0.25 | 72 |
|  | SOLARBRONZE + SOLARBAN 60 (3) Clear   | 42 | 7  | 9  | 0.29 | 0.24 | 0.32 | 95 |
|  | OPTIGRAY + SOLARBAN 60 (3) Clear      | 50 | 8  | 9  | 0.29 | 0.24 | 0.35 | 93 |
|  | SOLARGRAY + SOLARBAN 60 (3) Clear     | 35 | 7  | 9  | 0.29 | 0.24 | 0.29 | 93 |
|  | GRAYLITE II + SOLARBAN 60 (3) Clear   | 7  | 4  | 8  | 0.29 | 0.24 | 0.13 | 84 |

**SOLARBAN® 60 Solar Control Low-e Glass on OPTIBLUE®†† (formerly SOLARBAN® z50 Glass)**

|  |                                  |    |   |    |      |      |      |    |
|--|----------------------------------|----|---|----|------|------|------|----|
|  | SOLARBAN 60 (2) OPTIBLUE + Clear | 51 | 8 | 11 | 0.29 | 0.24 | 0.32 | 91 |
|--|----------------------------------|----|---|----|------|------|------|----|

**SOLARBAN® 70 Solar Control Low-e Glass† (formerly SOLARBAN® 70XL Glass)**

|  |  |    |    |    |      |      |      |    |
|--|--|----|----|----|------|------|------|----|
|  | SOLARBAN 70 (2) <sup>†</sup> + Clear       | 64 | 13 | 14 | 0.28 | 0.24 | 0.27 | 91 |
|  | SOLARBAN 70 (2) SOLEXIA + Clear            | 56 | 11 | 14 | 0.28 | 0.24 | 0.26 | 85 |
|  | SOLARBAN 70 (2) ATLANTICA + Clear          | 49 | 10 | 13 | 0.28 | 0.24 | 0.23 | 81 |
|  | SOLARBAN 70 (2) AZURIA + Clear             | 50 | 10 | 13 | 0.28 | 0.24 | 0.24 | 69 |
|  | SOLARBAN 70 (2) SOLARBLUE + Clear          | 41 | 8  | 13 | 0.28 | 0.24 | 0.22 | 81 |
|  | SOLARBAN 70 (2) PACIFICA + Clear           | 31 | 7  | 13 | 0.28 | 0.24 | 0.19 | 69 |
|  | SOLARBAN 70 (2) SOLARBRONZE + Clear        | 39 | 8  | 13 | 0.28 | 0.24 | 0.20 | 93 |
|  | SOLARBAN 70 (2) OPTIGRAY + Clear           | 46 | 9  | 13 | 0.28 | 0.24 | 0.23 | 89 |
|  | SOLARBAN 70 (2) SOLARGRAY + Clear          | 32 | 7  | 13 | 0.28 | 0.24 | 0.19 | 89 |
|  | SOLEXIA + SOLARBAN 70 (3) <sup>†</sup>     | 56 | 11 | 12 | 0.28 | 0.24 | 0.32 | 85 |
|  | ATLANTICA + SOLARBAN 70 (3) <sup>†</sup>   | 48 | 9  | 11 | 0.28 | 0.24 | 0.28 | 81 |
|  | AZURIA + SOLARBAN 70 (3) <sup>†</sup>      | 49 | 9  | 11 | 0.28 | 0.24 | 0.29 | 75 |
|  | SOLARBLUE + SOLARBAN 70 (3) <sup>†</sup>   | 41 | 8  | 12 | 0.28 | 0.24 | 0.27 | 81 |
|  | PACIFICA + SOLARBAN 70 (3) <sup>†</sup>    | 31 | 6  | 10 | 0.28 | 0.24 | 0.22 | 69 |
|  | SOLARBRONZE + SOLARBAN 70 (3) <sup>†</sup> | 38 | 8  | 11 | 0.28 | 0.24 | 0.26 | 93 |
|  | OPTIGRAY + SOLARBAN 70 (3) <sup>†</sup>    | 46 | 9  | 12 | 0.28 | 0.24 | 0.28 | 90 |
|  | SOLARGRAY + SOLARBAN 70 (3) <sup>†</sup>   | 32 | 7  | 11 | 0.28 | 0.24 | 0.24 | 89 |
|  | GRAYLITE II + SOLARBAN 70 (3) <sup>†</sup> | 6  | 4  | 10 | 0.28 | 0.24 | 0.11 | 81 |

**SOLARBAN® 70 Solar Control Low-e Glass on OPTIBLUE®†† (formerly SOLARBAN® z75 Glass)**

|  |                                  |    |   |    |      |      |      |    |
|--|----------------------------------|----|---|----|------|------|------|----|
|  | SOLARBAN 70 (2) OPTIBLUE + Clear | 46 | 9 | 13 | 0.28 | 0.24 | 0.23 | 87 |
|--|----------------------------------|----|---|----|------|------|------|----|

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

| Outdoor Lite:<br>Coating if Any<br>(Surface) Glass | Glass Type<br>+<br>Indoor Lite:<br>Coating if Any<br>(Surface) Glass | Visible Light<br>Transmittance<br>(VLT) <sup>2</sup> % | Visible Light Reflectance <sup>2</sup> |            | (Btu/hr·ft <sup>2</sup> ·°F)<br>NFRC U-Value <sup>3</sup> |              | Solar Heat Gain<br>Coefficient<br>(SHGC) <sup>4</sup> | Color Rendering<br>Index (CRI) <sup>5</sup> |
|--|--|--|--|------------|---|--------------|---|---|
|  |  |  | Exterior %                             | Interior % | Winter<br>Nighttime                                       | Winter Argon |   |   |

**SOLARBAN® 72 Solar Control Low-e Glass**

|                                       |    |    |    |      |      |      |    |
|---------------------------------------|----|----|----|------|------|------|----|
| SOLARBAN 72 (2) ACUITY + ACUITY       | 67 | 13 | 14 | 0.28 | 0.24 | 0.28 | 94 |
| SOLARBAN 72 (2) STARPHIRE + STARPHIRE | 68 | 13 | 14 | 0.28 | 0.24 | 0.28 | 95 |

**SOLARBAN® 90 Solar Control Low-e Glass**

|                                       |    |    |    |      |      |      |    |
|---------------------------------------|----|----|----|------|------|------|----|
| SOLARBAN 90 (2) Clear + Clear         | 51 | 12 | 19 | 0.29 | 0.24 | 0.23 | 92 |
| SOLARBAN 90 (2) ACUITY + ACUITY       | 53 | 12 | 19 | 0.29 | 0.24 | 0.23 | 94 |
| SOLARBAN 90 (2) STARPHIRE + STARPHIRE | 54 | 13 | 20 | 0.29 | 0.24 | 0.23 | 95 |
| SOLARBAN 90 (2) SOLEXIA + Clear       | 44 | 10 | 19 | 0.29 | 0.24 | 0.22 | 86 |
| SOLARBAN 90 (2) ATLANTICA + Clear     | 39 | 9  | 19 | 0.29 | 0.24 | 0.20 | 82 |
| SOLARBAN 90 (2) AZURIA + Clear        | 39 | 9  | 19 | 0.29 | 0.24 | 0.21 | 75 |
| SOLARBAN 90 (2) OPTIBLUE + Clear      | 37 | 8  | 19 | 0.29 | 0.24 | 0.20 | 88 |
| SOLARBAN 90 (2) SOLARBLUE + Clear     | 32 | 8  | 18 | 0.29 | 0.24 | 0.19 | 81 |
| SOLARBAN 90 (2) PACIFICA + Clear      | 24 | 6  | 18 | 0.29 | 0.24 | 0.17 | 69 |
| SOLARBAN 90 (2) SOLARBRONZE + Clear   | 31 | 7  | 18 | 0.29 | 0.24 | 0.18 | 94 |
| SOLARBAN 90 (2) OPTIGRAY + Clear      | 36 | 8  | 19 | 0.29 | 0.24 | 0.20 | 90 |
| SOLARBAN 90 (2) SOLARGRAY + Clear     | 26 | 6  | 18 | 0.29 | 0.24 | 0.17 | 90 |
| SOLEXIA + SOLARBAN 90 (3) Clear       | 44 | 16 | 12 | 0.29 | 0.24 | 0.30 | 86 |
| ATLANTICA + SOLARBAN 90 (3) Clear     | 39 | 13 | 12 | 0.29 | 0.24 | 0.26 | 82 |
| AZURIA + SOLARBAN 90 (3) Clear        | 39 | 13 | 12 | 0.29 | 0.24 | 0.27 | 75 |
| SOLARBLUE + SOLARBAN 90 (3) Clear     | 32 | 10 | 11 | 0.29 | 0.24 | 0.25 | 81 |
| PACIFICA + SOLARBAN 90 (3) Clear      | 24 | 8  | 11 | 0.29 | 0.24 | 0.21 | 69 |
| SOLARBRONZE + SOLARBAN 90 (3) Clear   | 30 | 10 | 11 | 0.29 | 0.24 | 0.24 | 94 |
| OPTIGRAY + SOLARBAN 90 (3) Clear      | 36 | 12 | 11 | 0.29 | 0.24 | 0.27 | 90 |
| SOLARGRAY + SOLARBAN 90 (3) Clear     | 25 | 8  | 11 | 0.29 | 0.24 | 0.22 | 90 |
| GRAYLITE II + SOLARBAN 90 (3) Clear   | 5  | 4  | 11 | 0.29 | 0.24 | 0.11 | 82 |

**SOLARBAN® R100 Neutral-Reflective Low-e Glass**

|   |    |    |    |      |      |      |    |
|---|----|----|----|------|------|------|----|
| SOLARBAN R100 (2) Clear + Clear         | 42 | 32 | 14 | 0.29 | 0.25 | 0.23 | 93 |
| SOLARBAN R100 (2) ACUITY + ACUITY       | 43 | 33 | 13 | 0.29 | 0.25 | 0.23 | 92 |
| SOLARBAN R100 (2) STARPHIRE + STARPHIRE | 44 | 33 | 14 | 0.29 | 0.25 | 0.23 | 93 |
| SOLARBAN R100 (2) SOLEXIA + Clear       | 36 | 25 | 13 | 0.29 | 0.25 | 0.21 | 83 |
| SOLARBAN R100 (2) ATLANTICA + Clear     | 31 | 20 | 13 | 0.29 | 0.25 | 0.19 | 80 |
| SOLARBAN R100 (2) AZURIA + Clear        | 32 | 21 | 13 | 0.29 | 0.25 | 0.19 | 72 |
| SOLARBAN R100 (2) OPTIBLUE + Clear      | 30 | 19 | 13 | 0.29 | 0.25 | 0.20 | 86 |
| SOLARBAN R100 (2) SOLARBLUE + Clear     | 26 | 15 | 13 | 0.29 | 0.25 | 0.19 | 79 |
| SOLARBAN R100 (2) PACIFICA + Clear      | 20 | 11 | 13 | 0.29 | 0.25 | 0.16 | 66 |
| SOLARBAN R100 (2) SOLARBRONZE + Clear   | 25 | 15 | 13 | 0.29 | 0.25 | 0.18 | 95 |
| SOLARBAN R100 (2) OPTIGRAY + Clear      | 29 | 18 | 13 | 0.29 | 0.25 | 0.20 | 89 |
| SOLARBAN R100 (2) SOLARGRAY + Clear     | 21 | 12 | 13 | 0.29 | 0.25 | 0.17 | 89 |

**SOLARBAN® R77 Neutral-Reflective Low-e Glass**

|  |    |    |    |      |      |      |    |
|--|----|----|----|------|------|------|----|
| SOLARBAN R77 (2) Clear + Clear         | 47 | 25 | 16 | 0.29 | 0.24 | 0.25 | 94 |
| SOLARBAN R77 (2) ACUITY + ACUITY       | 49 | 26 | 16 | 0.29 | 0.24 | 0.25 | 95 |
| SOLARBAN R77 (2) STARPHIRE + STARPHIRE | 50 | 26 | 16 | 0.29 | 0.24 | 0.25 | 98 |
| SOLARBAN R77 (2) SOLEXIA + Clear       | 41 | 20 | 16 | 0.29 | 0.24 | 0.23 | 87 |
| SOLARBAN R77 (2) ATLANTICA + Clear     | 35 | 16 | 16 | 0.29 | 0.24 | 0.20 | 83 |
| SOLARBAN R77 (2) AZURIA + Clear        | 36 | 17 | 16 | 0.29 | 0.24 | 0.21 | 76 |
| SOLARBAN R77 (2) OPTIBLUE + Clear      | 34 | 15 | 16 | 0.29 | 0.24 | 0.21 | 90 |
| SOLARBAN R77 (2) SOLARBLUE + Clear     | 30 | 13 | 16 | 0.29 | 0.24 | 0.20 | 83 |
| SOLARBAN R77 (2) PACIFICA + Clear      | 23 | 9  | 15 | 0.29 | 0.24 | 0.17 | 70 |
| SOLARBAN R77 (2) SOLARBRONZE + Clear   | 28 | 12 | 16 | 0.29 | 0.24 | 0.19 | 96 |
| SOLARBAN R77 (2) OPTIGRAY + Clear      | 33 | 15 | 16 | 0.29 | 0.24 | 0.21 | 93 |
| SOLARBAN R77 (2) SOLARGRAY + Clear     | 23 | 10 | 15 | 0.29 | 0.24 | 0.18 | 93 |

**SOLARBAN® R67 Neutral-Reflective Low-e Glass (formerly SOLARBAN® 67 Glass)**

|  |    |    |    |      |      |      |    |
|--|----|----|----|------|------|------|----|
| SOLARBAN R67 (2) Clear + Clear         | 54 | 19 | 16 | 0.29 | 0.24 | 0.29 | 92 |
| SOLARBAN R67 (2) ACUITY + ACUITY       | 56 | 19 | 16 | 0.29 | 0.24 | 0.30 | 94 |
| SOLARBAN R67 (2) STARPHIRE + STARPHIRE | 57 | 20 | 16 | 0.29 | 0.24 | 0.30 | 95 |
| SOLARBAN R67 (2) SOLEXIA + Clear       | 47 | 16 | 16 | 0.29 | 0.24 | 0.25 | 85 |
| SOLARBAN R67 (2) ATLANTICA + Clear     | 41 | 13 | 16 | 0.29 | 0.24 | 0.22 | 82 |
| SOLARBAN R67 (2) AZURIA + Clear        | 42 | 13 | 16 | 0.29 | 0.24 | 0.23 | 74 |

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

| Outdoor Lite:<br>Coating if Any<br>(Surface) Glass | Glass Type<br>+ | Indoor Lite:<br>Coating if Any<br>(Surface) Glass | Visible Light<br>Transmittance<br>(VLT) <sup>2</sup> % | Visible Light Reflectance <sup>2</sup> |            | (Btu/hr·ft <sup>2</sup> ·°F)<br>NFRC U-Value <sup>3</sup> |              | Solar Heat Gain<br>Coefficient<br>(SHGC) <sup>4</sup> | Color Rendering<br>Index (CRI) <sup>5</sup> |
|--|-----------------|---|--|--|------------|---|--------------|---|---|
|  |                 |   |  | Exterior %                             | Interior % | Winter<br>Nighttime                                       | Winter Argon |   |   |

**SOLARBAN® R67 Neutral-Reflective Low-e Glass (formerly SOLARBAN® 67 Glass) (Continued)**

|                                      |  |  |    |    |    |      |      |      |    |
|--------------------------------------|--|--|----|----|----|------|------|------|----|
| SOLARBAN R67 (2) OPTIBLUE + Clear    |  |  | 39 | 12 | 15 | 0.29 | 0.24 | 0.25 | 88 |
| SOLARBAN R67 (2) SOLARBLUE + Clear   |  |  | 34 | 10 | 15 | 0.29 | 0.24 | 0.23 | 81 |
| SOLARBAN R67 (2) PACIFICA + Clear    |  |  | 26 | 8  | 15 | 0.29 | 0.24 | 0.19 | 68 |
| SOLARBAN R67 (2) SOLARBRONZE + Clear |  |  | 32 | 10 | 15 | 0.29 | 0.24 | 0.22 | 95 |
| SOLARBAN R67 (2) OPTIGRAY + Clear    |  |  | 38 | 12 | 15 | 0.29 | 0.24 | 0.24 | 90 |
| SOLARBAN R67 (2) SOLARGRAY + Clear   |  |  | 27 | 8  | 15 | 0.29 | 0.24 | 0.20 | 90 |

**SUNGATE® 400 Low-E Glass**

|                                       |  |  |    |    |    |      |      |      |     |
|---------------------------------------|--|--|----|----|----|------|------|------|-----|
| SUNGATE 400 (2) Clear + Clear         |  |  | 76 | 14 | 14 | 0.32 | 0.28 | 0.60 | 96  |
| SUNGATE 400 (2) STARPHIRE + STARPHIRE |  |  | 80 | 14 | 14 | 0.32 | 0.28 | 0.68 | 100 |
| CLEAR + SUNGATE 400 (3) Clear         |  |  | 76 | 14 | 14 | 0.32 | 0.28 | 0.63 | 96  |
| SOLEXIA + SUNGATE 400 (3) Clear       |  |  | 66 | 11 | 13 | 0.32 | 0.28 | 0.44 | 89  |
| ATLANTICA + SUNGATE 400 (3) Clear     |  |  | 58 | 9  | 12 | 0.32 | 0.28 | 0.35 | 85  |
| AZURIA + SUNGATE 400 (3) Clear        |  |  | 59 | 10 | 12 | 0.32 | 0.28 | 0.34 | 78  |
| SOLARBLUE + SUNGATE 400 (3) Clear     |  |  | 48 | 8  | 12 | 0.32 | 0.28 | 0.42 | 85  |
| PACIFICA + SUNGATE 400 (3) Clear      |  |  | 37 | 7  | 11 | 0.32 | 0.28 | 0.30 | 72  |
| SOLARBRONZE + SUNGATE 400 (3) Clear   |  |  | 46 | 8  | 12 | 0.32 | 0.28 | 0.44 | 95  |
| OPTIGRAY + SUNGATE 400 (3) Clear      |  |  | 54 | 9  | 12 | 0.32 | 0.28 | 0.46 | 94  |
| SOLARGRAY + SUNGATE 400 (3) Clear     |  |  | 38 | 7  | 12 | 0.32 | 0.28 | 0.39 | 94  |
| GRAYLITE II + SUNGATE 400 (3) Clear   |  |  | 8  | 4  | 11 | 0.32 | 0.28 | 0.15 | 86  |

**VISTACOOl® Subtly Reflective Glass**

|                                |  |  |    |    |    |      |      |      |    |
|--------------------------------|--|--|----|----|----|------|------|------|----|
| VISTACOOl (2) AZURIA + Clear   |  |  | 47 | 21 | 32 | 0.47 | 0.45 | 0.34 | 76 |
| VISTACOOl (2) PACIFICA + Clear |  |  | 29 | 11 | 31 | 0.47 | 0.45 | 0.32 | 73 |

**SOLARCOOL® Reflective Glass**

|                                   |  |  |    |    |    |      |      |      |    |
|-----------------------------------|--|--|----|----|----|------|------|------|----|
| SOLARCOOL (2) AZURIA + Clear      |  |  | 24 | 20 | 38 | 0.47 | 0.45 | 0.25 | 85 |
| SOLARCOOL (2) PACIFICA + Clear    |  |  | 15 | 10 | 38 | 0.47 | 0.45 | 0.25 | 81 |
| SOLARCOOL (2) SOLARBLUE + Clear   |  |  | 20 | 15 | 38 | 0.47 | 0.45 | 0.32 | 95 |
| SOLARCOOL (2) SOLARBRONZE + Clear |  |  | 19 | 14 | 38 | 0.47 | 0.45 | 0.34 | 85 |
| SOLARCOOL (2) SOLARGRAY + Clear   |  |  | 16 | 11 | 38 | 0.47 | 0.45 | 0.32 | 92 |

**VISTACOOl® and SOLARCOOL® with SOLARBAN® 60 Solar Control Low-e Glass (3)**

|   |  |  |    |    |    |      |      |      |    |
|---|--|--|----|----|----|------|------|------|----|
| VISTACOOl (2) AZURIA + SOLARBAN 60 (3) Clear      |  |  | 42 | 20 | 24 | 0.29 | 0.24 | 0.26 | 78 |
| VISTACOOl (2) PACIFICA + SOLARBAN 60 (3) Clear    |  |  | 26 | 11 | 23 | 0.29 | 0.24 | 0.22 | 73 |
| SOLARCOOL (2) AZURIA + SOLARBAN 60 (3) Clear      |  |  | 21 | 19 | 29 | 0.29 | 0.24 | 0.17 | 85 |
| SOLARCOOL (2) SOLARBLUE + SOLARBAN 60 (3) Clear   |  |  | 17 | 14 | 29 | 0.29 | 0.24 | 0.18 | 92 |
| SOLARCOOL (2) PACIFICA + SOLARBAN 60 (3) Clear    |  |  | 13 | 10 | 29 | 0.29 | 0.24 | 0.15 | 80 |
| SOLARCOOL (2) SOLARBRONZE + SOLARBAN 60 (3) Clear |  |  | 17 | 14 | 29 | 0.29 | 0.24 | 0.18 | 85 |
| SOLARCOOL (2) SOLARGRAY + SOLARBAN 60 (3) Clear   |  |  | 14 | 11 | 29 | 0.29 | 0.24 | 0.17 | 91 |

**VISTACOOl® and SOLARCOOL® with SOLARBAN® 70 Solar Control Low-e Glass (3)<sup>†</sup> (formerly Solarban® 70XL Glass)**

|  |  |  |    |    |    |      |      |      |    |
|--|--|--|----|----|----|------|------|------|----|
| VISTACOOl (2) AZURIA + SOLARBAN 70 <sup>†</sup>      |  |  | 38 | 21 | 23 | 0.28 | 0.24 | 0.24 | 76 |
| VISTACOOl (2) PACIFICA + SOLARBAN 70 <sup>†</sup>    |  |  | 24 | 11 | 22 | 0.28 | 0.24 | 0.19 | 71 |
| SOLARCOOL (2) AZURIA + SOLARBAN 70 <sup>†</sup>      |  |  | 19 | 19 | 27 | 0.28 | 0.24 | 0.16 | 82 |
| SOLARCOOL (2) SOLARBLUE + SOLARBAN 70 <sup>†</sup>   |  |  | 16 | 14 | 27 | 0.28 | 0.24 | 0.15 | 89 |
| SOLARCOOL (2) PACIFICA + SOLARBAN 70 <sup>†</sup>    |  |  | 12 | 10 | 27 | 0.28 | 0.24 | 0.13 | 77 |
| SOLARCOOL (2) SOLARBRONZE + SOLARBAN 70 <sup>†</sup> |  |  | 15 | 14 | 27 | 0.28 | 0.24 | 0.15 | 88 |
| SOLARCOOL (2) SOLARGRAY + SOLARBAN 70 <sup>†</sup>   |  |  | 13 | 11 | 27 | 0.28 | 0.24 | 0.14 | 91 |

<sup>†</sup> Solarban® 70 (formerly Solarban® 70XL) for annealed applications is applied to low-iron glass; heat treated applications will require either clear or low-iron glass depending on manufacturing process.

<sup>††</sup> Optiblue® is a unique substrate by Vitro Glass designed for use with several Solarban® coatings.

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·ft<sup>2</sup>·°F. The lower the number, the better the insulating performance. This number is the reciprocal of the R-value. Winter argon represents the winter nighttime 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. Color Rendering Index (CRI) is a measurement from 0 to 100 of how accurately a color is reproduced under certain lighting conditions, relative to natural light. A value of 100 would indicate an unobstructed view. For glass, the color rendering index is calculated using the LBNL Optics 6 software following EN410 methodology, which is defined as the "change in color of an object as a result of the light being transmitted by the glass."

# A Culture of Sustainability

## Innovating for the Environment

At Vitro Architectural Glass, it is our mission to continually raise the industry standard for sustainability. Vitro has raised the bar by becoming the first U.S. glass manufacturer to have its entire collection of architectural glass products recognized by the *Cradle to Cradle Certified*® Products Program and is the first North American manufacturer to publish third-party verified Environmental Product Declarations (EPDs) for flat glass and processed glass products. Vitro also partners with Walker Glass to offer *AviProtek*® E glass, which unites bird-safe, acid-etched visual patterns with *Solarban*® low-e coatings to reduce bird collisions with glass and improve energy performance.

## Reducing Carbon in the Built Environment

As architects and glaziers work to design and construct building projects in a more sustainable manner, the consideration of embodied carbon has become a bigger factor in understanding the overall impact of a project's carbon footprint. Designers are working to balance the reduction of emissions from a building's operations, known as operational carbon, with emissions caused by the manufacturing and installation of construction materials, known as embodied carbon.

According to the U.S. Department of Energy, low-e coatings reduce the energy lost through typical windows by 35%, resulting in about 1.5 quads in U.S. annual energy savings and significantly lower a building's operational carbon generated by HVAC. *Solarban*® solar control low-e glasses reduce solar heat gain, which is quantified by SHGC. *Sungate*® passive low-e coatings transmit solar heat energy into buildings, generating higher SHGCs. Both types of low-e coatings also improve U-values.

### The Tower at PNC Plaza

**Products**  
Sungate® 400 Starphire® Glass

**Page 12**

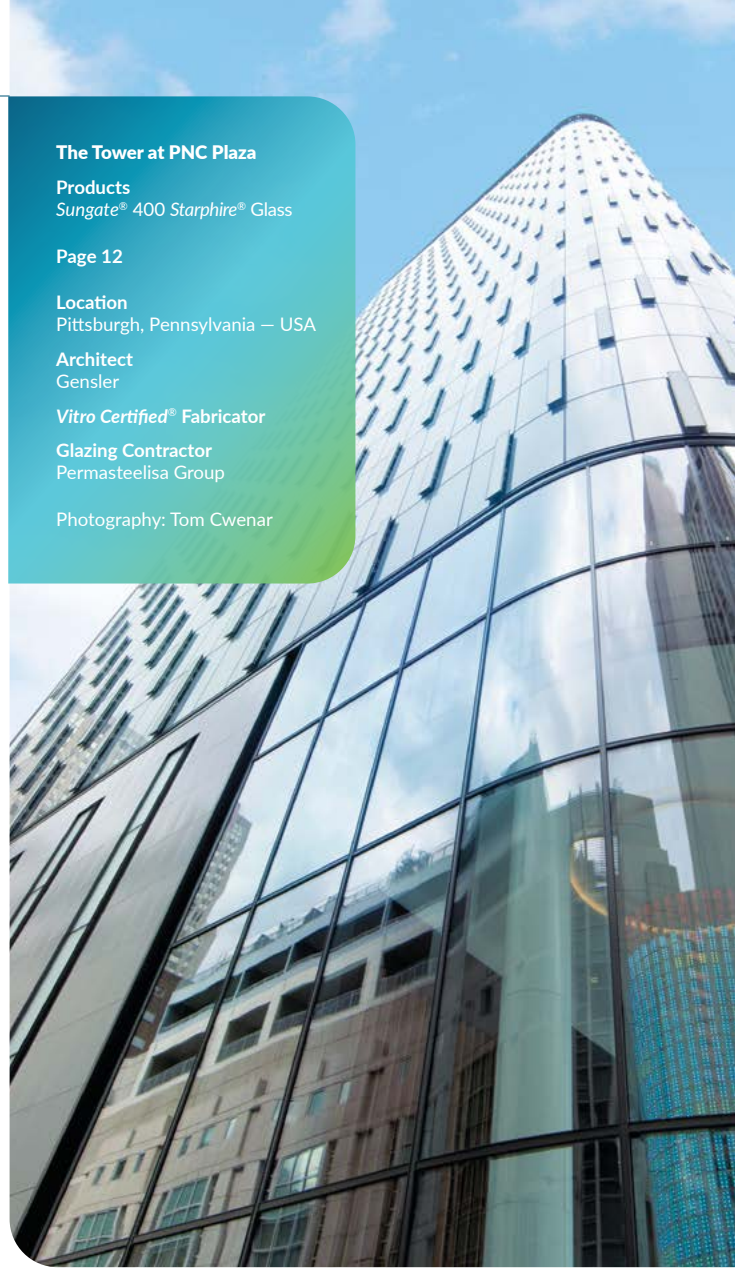
**Location**  
Pittsburgh, Pennsylvania — USA

**Architect**  
Gensler

**Vitro Certified® Fabricator**

**Glazing Contractor**  
Permasteelisa Group

**Photography:** Tom Cwenaar



## Sustainability Support

Download EPDs, Get LEED Support & More  
[vitroglazings.com/sustainability](http://vitroglazings.com/sustainability)  
[archresource@vitro.com](mailto:archresource@vitro.com)  
 1.855.887.6457 / 1.855.VTRO.GLS



LEED®—an acronym for Leadership in Energy and Environmental Design™—is a registered trademark of the U.S. Green Building Council®. Cradle to Cradle Certified® is a trademark licensed by the Cradle to Cradle Products Innovation Institute.

Additionally, new glass technologies like *VacuMax™* VIG units, which feature an unparalleled ability to improve a building’s insulation factor, further reduce operational carbon by ensuring less energy is lost through a façade’s glazing.

**Embodied Carbon and Glass**

Perhaps the most comprehensive metric to consider as it relates to embodied carbon in glass is Global Warming Potential (GWP). Most of the embodied carbon in glass originates with the energy-intensive process of heating the melting furnace to 3,000 degrees Fahrenheit to convert a blend of silica, soda ash, dolomite, metal compounds and recycled cullet glass to flat glass.

To help reduce embodied carbon and overall energy consumption in glass production, Vitro (as its legacy company PPG Glass) pioneered the use of oxy-fuel technology, which can reduce energy consumption by as much as 20% and cut greenhouse gas emissions in half. Vitro uses oxy-fuel technology at three U.S. plants and licenses this technology to other glass manufacturers around the world.

Information about the additional steps Vitro is taking to support a more sustainable built environment can be found at [vitroglazings.com/sustainability](http://vitroglazings.com/sustainability).

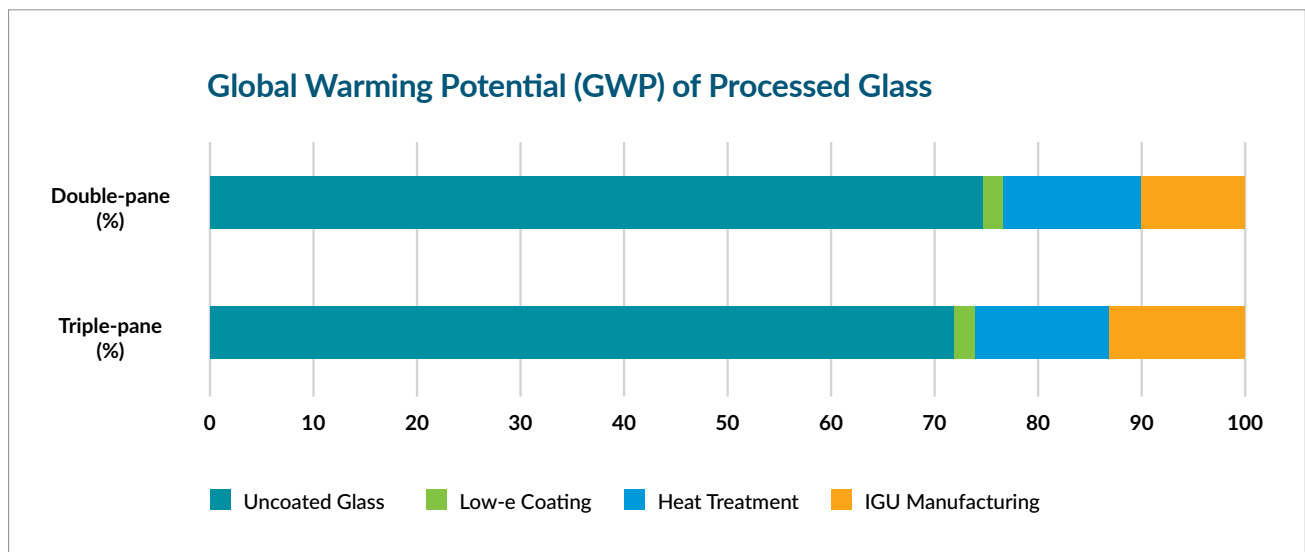
**LEED Support**

Vitro Architectural Glass has a long history of helping architects incorporate many of the principles now codified in the LEED rating system, which designates multiple options for building projects to earn points in nine credit categories. Vitro products have the potential to help building projects earn LEED points in at least seven of those categories. Get guidance on earning LEED credits through your glass selections at [vitroglazings.com/leed](http://vitroglazings.com/leed).

**The Vitro Sustainability Model**

Vitro understands the importance of preserving the environment. Supported by our Safety, Healthy Environment and Energy Policy, Vitro designs and implements programs and projects that support sustainable development such as glass recycling, implementing an energy-efficient Energy Management System and powering select plants with renewable energy.

Vitro also operates under a Code of Ethics and Conduct that defines its commitments to preserving human rights, managing commercial relations, respecting and promoting neighboring communities, caring for and protecting the environment, and maintaining harmonious relationships with governments and the authorities.



Of the embodied carbon in an IGU, approximately 75% comes from manufacturing the flat glass lites. Of the remaining, 13% comes from heat strengthening or tempering the glass, 10% comes from the IGU fabrication process itself, and just 2% comes from the process of adding low-e coatings.

# Vitro Certified<sup>®</sup> Network

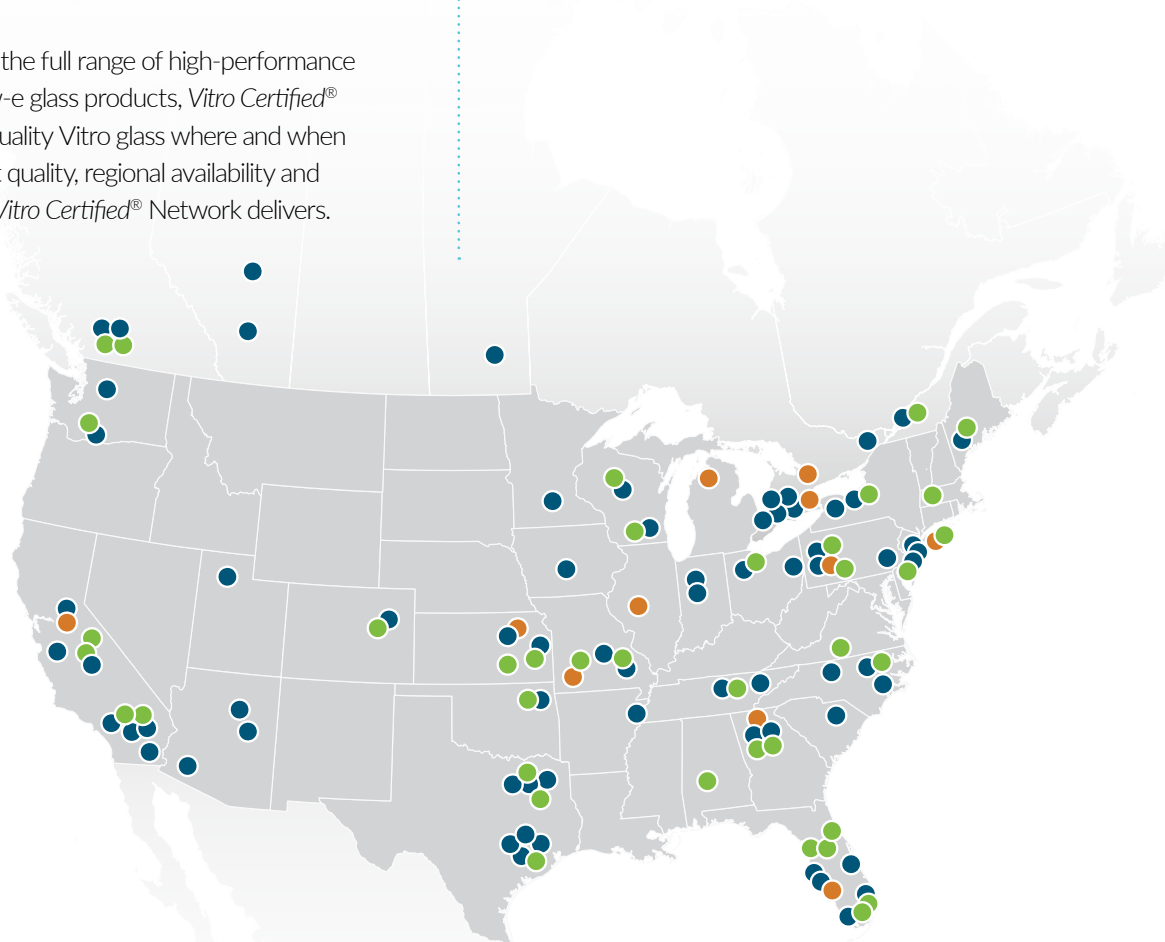
## Regional Sourcing. Superior Products. Unmatched Service.

Your projects require glass fabricators that understand the nuances of commercial magnetron sputtered vacuum deposition (MSVD) glass fabrication – and the expectations of glaziers and building owners. That's why every member of the *Vitro Certified<sup>®</sup>* Network must pass a demanding annual vetting process, which provides you with a selection of only the most experienced, knowledgeable fabricators throughout North America and beyond.

*Vitro Certified<sup>®</sup>* Network members are audited annually and evaluated across more than 100 criteria, from storage and handling to recordkeeping and product support. That means every member has the tools necessary to ensure a quality product, delivered on-time and on-budget.

As the exclusive source of the full range of high-performance *Solarban<sup>®</sup>* solar control low-e glass products, *Vitro Certified<sup>®</sup>* Fabricators provide high-quality Vitro glass where and when you need it. For consistent quality, regional availability and enhanced lead times, the *Vitro Certified<sup>®</sup>* Network delivers.

- *Vitro Certified<sup>®</sup>* Fabricators
- *Vitro Certified<sup>®</sup>* Laminators
- *Vitro Certified<sup>®</sup>* Architectural Window Manufacturers



*Vitro Certified<sup>®</sup>* Fabricators

*Vitro Certified<sup>®</sup>* Laminators

*Vitro Certified<sup>®</sup>* Architectural Window Manufacturers

*Vitro Certified<sup>®</sup>* International Fabricators

*Vitro Certified<sup>®</sup>* International Laminators

All members of the *Vitro Certified<sup>®</sup>* Network can enroll unique or high-profile projects in the *Vitro Concierge Program<sup>®</sup>*, a priority glass scheduling and delivery program.

# Glass Design Resources

Vitro Architectural Glass offers the industry's most comprehensive portals for glass research, product selection and specification.

## Online Tools

Explore our suite of specification and product selection tools that can lead to extraordinary projects.

### Search

[search.vitroglazings.com](http://search.vitroglazings.com)

Use Search to explore Vitro's extensive selection of products.

### Construct

[construct.vitroglazings.com](http://construct.vitroglazings.com)

With Construct, you can simplify the process of specifying Vitro glass and even competitive glass products — now featuring password-free access to International Glazing Database (IGDB) data.

### Project & Case Study Gallery

[projects.vitroglazings.com](http://projects.vitroglazings.com)

Browse our Project & Case Study Gallery to view completed projects that highlight innovative and creative applications of Vitro glass products.

### Sample Order & Literature Fulfillment Center

[samples.vitroglazings.com](http://samples.vitroglazings.com)

Order a sample to see the amazing aesthetics for yourself.

### The VitroSphere™ Digital Glass Simulator

[thevitrosphere.com](http://thevitrosphere.com)

Our newest glass selection and design tool enables you to visualize and compare Solarban® glass products' color, transparency and reflectance on different building types at various times of day and from both the interior and exterior of the building.



## Vitro Glass Education Center

[glassed.vitroglazings.com](http://glassed.vitroglazings.com)

Designed to deliver technical information in an accessible, engaging format, the Vitro Glass Education Center features short videos, illustrations and articles that address the key challenges facing architects, specifiers and other building professionals today.



[vitroglazings.com](http://vitroglazings.com)

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## University of California ISEB

### Products

*Solarban*® 70\* Glass

### Page 9

### Location

Irvine, California — USA

### Architect

LMN

### *Vitro Certified*® Fabricator

Glassfab Tempering Services Inc.

### Glazing Contractor

Walters & Wolf

Photography: Steve Zylus

\*Formerly *Solarban*® 70XL glass

