the AviProtek® Pacific Coast e-book of bird friendly-glass

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second edition

preface

Thanks for your time and attention. The goal of AviProtek® Pacific Coast e-book of bird-friendly glass is to help you make informed and thoughtful decisions when specifying bird-friendly glass for your project. This e-book will bring you up to speed on current Pacific coast legislation and support you in your decision-making – efficiently and effectively.

Walker Glass has been deeply involved in the development, manufacturing and marketing of environmentally responsible bird-friendly glass since the topic gathered interest in the North American market some 10 years ago. We made a decision then to be the leader in this space and have remained true to this goal. Our deeply held passions have translated into products that are well researched and conceived and offer the architectural community the industry's most effective and comprehensive (first surface) solutions that are HPD® and EPD certified.

On behalf of all those within our firm who have dedicated thousands of hours on the AviProtek® products in support of your project goals, thanks so much for taking the time to use this document as you see fit, I hope it helps.

Charles Alexander
Vice-President of Sales and Marketing
Walker Glass Company Ltd.

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Portions of this guide were produced in collaboration with Vitro Architectural Glass.

Up to a billion birds die each year from collisions with glass.

Learn more

why birds can't see glass

This section was authored by Dr. Daniel Klem Jr., Ph.D., D.Sc., professor of biology, and Sarkis Acopian professor of ornithology and conservation biology at Mulhenberg College.

For millennia, glass windows have enriched human lives. However, while they contribute enormously to human health and culture, glass windows have been catastrophic for wild bird populations. Today's glass structures kill billions of birds worldwide each year, and up to one billion in North America alone. When faced with glass, birds don't see it as a solid surface the way we do. Instead, they're more likely to mistake it for an opening. When the glass reflects surrounding vegetation, birds mistake the reflection for an actual environment and may try to fly into it, with deadly results.

where does it happen?

The first few stories of a building are a danger zone for bird strikes. That's because the trees and shrubs that make up birds' natural habitats are mainly within this range. Their reflections upon a building's lowest stories confuse birds, increasing strike incidents in this zone. It's easy to underestimate the risk of bird collision, but consider this: a small bird like a sparrow can build up deadly speed in as little as 3.3' (1m). Lethal collisions are possible wherever birds and glass coexist.

when does it happen?

Unlike predators, famine and disease, glass collision is an indiscriminate killer. Whether fit or sickly, old or young, all members of a species are at risk. Furthermore, birds are killed at all times of the day, in every season of the year, and under all weather conditions.

The key determinant of whether a bird will strike glass is not the bird or momentary conditions, but the glass and its surroundings. Certain environmental factors make glass especially hazardous to birds.

Danger Zone

risk factors

- **Reflection:** Glass is deceptive to birds because it reflects the nearby habitat, such as trees, vegetation, sky or clouds.
- **Transparency:** Collisions occur as birds attempt to reach vegetation, water sources and other attractants seen through clear glass.
- **Passage effect:** In certain light conditions, glass can appear black, creating the false impression of a safe passage for birds.

It is important to understand the threat that glass and nearby vegetation pose to birds. An inviting green roof becomes a danger to birds if the glass on lower levels is not made safe. Other structures such as bus or train shelters, balconies, guardrails, linkways (corridors), atriums and noise barriers can all be fatal obstructions if they are not made visible and safe to birds.

first surface markers

Scientific experiments show that to make glass truly safe for birds, patterning must cover its entire surface. The elements making up the pattern, also known as visual markers, can be of any shape including dots, lines and rectangles.

Whether retrofitting or creating new panes of glass for remodeled or new structures, patterning must be applied to the outside facing glass surface, which architects refer to as first surface or surface 1, to be most effective. During daylight, when conditions are brighter outside than inside, windows of all kinds reflect the facing habitat and sky like a mirror. First surface markers will always be visible, but patterns on inner surfaces are hidden by these reflections. The reflections deceive birds and increase the risk of strikes.

Inner-surface patterning can be effective in situations where light is equal on both sides of the glass, such as walkways and railings. However, for most window and cladding applications, it is important to use glass with first surface patterning.

2x4 rule

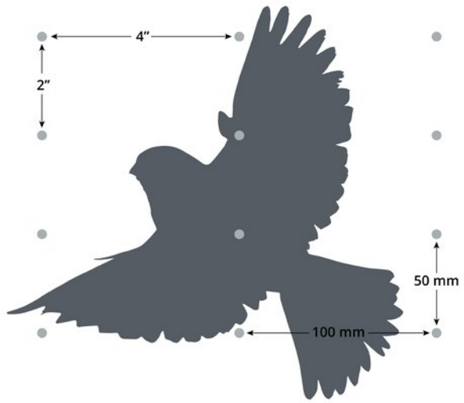
Pacific Coast municipalities, the National Glass Association (NGA), all support a prescriptive approach to bird-friendly building. In order to be classed as bird-friendly under these guidelines, glass patterning must conform to a set of researched and proven specifications, including spacing of 2”x2” or 2”x4”. These guidelines are known as the 2x2 and 2x4 rules, respectively.

The 2x4 rule is based on extensive field research by renowned ornithologist Dr. Daniel Klem. It stipulates that markers be spaced no more than 2 inches apart in the case of horizontal stripes or rows, and no more than 4 inches apart in the case of vertical stripes or columns.

Although birds cannot see glass, they see markers on the glass as obstacles. If the spaces between the markers appear too small for them to fly through, birds will veer away and avoid hitting the glass. Patterns which adhere to the 2x4 rule satisfy this requirement for most species, whereas the 2x2 rule is best suited to smaller species such as hummingbirds.

For best results, patterns should be etched on the first surface of the glass.

Example of a pattern following the 2x4 rule



in the end

Half of the bird species in North America are in decline, and bird populations the world over are undergoing similar depressions. Glass windows threaten birds regardless of their fitness, age or location. This issue threatens our planet’s biodiversity, and it is up to humans to fix it. Local legislations are steps in the right direction, requiring and guiding responsible construction practices to make our built environment safer for birds.

Daniel Klem Jr.

About Dr. Daniel Klem, Jr.

Daniel Klem, Jr., Ph.D., D.Sc. is a professor of biology, and Sarkis Acopian professor of ornithology and conservation biology at Mulhenberg College in Allentown, PA.

Recent accomplishments include the book, *Solid Air, Invisible Killer: Saving Billions of Birds from Windows*. You can find his interview with John Rowden, Audubon’s Senior Director of Bird-Friendly Communities, at audubon.org/news

Learn more about Dr. Klem’s work at danielklemjr.org

- **Glass:** AviProtek® 6mm clear glass with pattern 213 on surface 1 and Solarban® 70 on surface 2.
- **Bird Deterrence:** Horizontal stripes, 2in spacing. Meets 2x4 rule.
- **VLT:** 64%
- **SHGC:** 0.27

Pikes Peak Summit Visitor Center, Colorado Springs, CO

Pacific Coast bird-friendly legislation and guidelines

For the purposes of this document, the Pacific Coast states are defined as Washington, Oregon and California.

bird deterrence legislation

Pacific Coast states have often led the way in progressive ordinances, and the field of bird-safety is no exception. San Francisco became one of the first cities with mandatory bird-friendly building codes when it enacted its **Standards for Bird-Safe Buildings** in 2011. Since then, more and more municipalities have followed San Francisco's lead with their own bird deterrent building legislations.

Pacific Coast building codes favor the prescriptive method to bird deterrence, calling for patterns following the 2x4 rule. This approach is supported by leading scientists such as Dr. Daniel Klem, as well as the National Glass Association (NGA) and the General Services Administration (GSA).

- **Glass:** AviProtek® E 6mm clear glass with pattern 211 on surface 1 and Solarban® 70 on surface 2.
- **Bird Deterrence:** Varied vertical stripes. Meets 2x4 rule.
- **VLT:** 64%
- **SHGC:** 0.27

Oregon Zoo, Portland, OR

bird-friendly glazing requirements

territory			requirements		
city	voluntary/ obligatory	state	qualifying solutions[2]	height of glass to be treated	% of glass to be treated
state-wide	voluntary	CA	patterns meeting 2x4 rule	all	60% - 90%, depending on height
San Francisco	obligatory	CA	patterns meeting 2x4 rule	60' from grade	90%
Alameda	obligatory	CA	patterns meeting 2x4 rule	all	90%
Emeryville	obligatory	CA	patterns meeting 2x4 rule	all	90%
Mountain View	obligatory	CA	patterns meeting 2x4 rule	60' from grade	90%
Oakland	obligatory	CA	patterns meeting 2x4 rule	60' from grade	90%
Palo Alto[1]	obligatory	CA	patterns meeting 2x4 rule	not specified	not specified
Richmond	obligatory	CA	patterns meeting 2x4 rule	60' from grade 60' above a green roof of at least 2 acres in area	80 - 100%, depending on context
Portland	obligatory	OR	patterns meeting 2x4 rule	60' from grade 15' above a green roof area	90%

1. *Palo Alto does not have an ordinance but does have a standard condition for new commercial buildings. Applicants are referred to the San Francisco guidelines for information on proper use of bird friendly glazing.*
2. *Full surface etch on first the surface also qualifies, as it mutes reflections of natural elements and makes the glass appear solid to birds.*

resources

full legislations by city

For complete information on appropriate glass treatments and the conditions in which they must be used, please refer to each territory's requirements via the following links.

- California (voluntary)
- San Francisco, CA
- Alameda, CA
- Emeryville, CA
- Mountain View, CA
- Oakland, CA
- Palo Alto, CA
- Richmond, CA
- Portland, OR
  - Bird Safe Windows List
  - Central City Plan (please see p34)

California Coastal Commission

The California Coastal Commission's LCP Update Guide is a guidance document for municipalities developing Local Coastal Programs (LCP) to protect Environmentally Sensitive Habitat Areas (ESHA). As such, it influences bird friendly development ordinances in cities across California. This gives valuable insight into what factors to consider when planning a bird safe project.

Learn more about the LCP Update Guide here.

Pacific coast building codes:

Washington, Oregon, California

Energy Codes

In addition to meeting the bird deterrence legislation detailed on the previous page, architects, specifiers and building owners with projects in California, Oregon and Washington also are challenged to meet increasingly stringent energy efficiency mandates for fixed windows and commercial building envelopes.

Walker Glass designed AviProtek® E glass to meet these challenges by combining scientifically proven bird-friendly patterns with industry-leading solar control, low-emissivity (low-e) coatings by Vitro Architectural Glass.

When used as part of a high-quality fenestration design incorporating warm-edge spacers, argon gas-fill and thermally broken frames, Vitro Glass solar control, low-e coatings can help specifiers meet stringent “whole-product” mandates for **U-value (R-value)** and **Solar Heat Gain Coefficient (SHGC)**.

Aquarium of the Pacific, Long Beach, CA.

California Title 24

Among the three states mentioned above, California Title 24 maintains the strictest building energy efficiency standards. Adopted in 2021 with an effective working date of January 1, 2023, this code mandates SHCGs as low as 0.22 for fixed windows, and 0.25 for curtainwall and storefronts with maximum U-factors for these applications ranging from 0.34 to 0.41.

Learn more about Title 24 on the California Energy Commission’s website.

Oregon State Energy Codes

- **Commercial** (ASHRAE 90.1-2019 Amended to 2021 Oregon Energy Efficiency Specialty Code)
- **Residential** (Chapter 11: Energy Efficiency)

Washington State Energy Codes

- **Commercial**
- **Residential**

Oregon and Washington

Unlike California, which publishes its own building energy efficiency standards, Oregon and Washington, excepting some small amendments, adhere primarily to globally and nationally recognized codes such as ASHRAE 90.1-2019 and the International Energy Conservation Code (IECC).

In its most recent update, ASHRAE 90.1-2019 (which is referenced in the 2021 IECC) prescribed U-factor reductions of 5% to 17% as well as some slightly stricter SHGC requirements. As with California Title 24, these changes will dictate greater demand for improved framing with high-performance thermal breaks, as well as the use of warm-edge spacers with argon gas-fill and exposed low-e coatings on the room side of the building facade.

When specified with Vitro Glass products in the configurations detailed in the tables linked above, AviProtek® E glass can enable architects, specifiers and building owners in California, Oregon and Washington to meet their aesthetics and building efficiency requirements while accommodating new and future bird-safety legislation.

AviProtek® bird-friendly glass

bird deterrent solutions

Pacific Coast regulations require that glass patterning conform to the 2x4 rule to be considered safe for birds. A number of AviProtek® patterns meet this criterion, as do Walker Textures® full surface finishes.

Please see table 1 for a selection of qualifying products.

first surface treatment

Since AviProtek® patterns are etched onto the first surface of the glass, the markers will be visible to birds in any kind of lighting condition. First surface treatments stand out from reflections on the glass, whereas markers on inner surfaces can be hidden by reflections and glare. To mitigate the dangers of reflections and "black hole" effects, make sure to use windows with bird-friendly markers on the first surface of the glass.

performance

Acid etching is applied directly onto the first surface of the glass, so it won't peel, wear off or discolor over time. In fact, testing shows that AviProtek® and Walker Textures® match or surpass untreated glass in their overall strength and resistance to signs of wear. That's why these products are backed with a 10 year warranty against surface degradation.

See table 2 and table 3 for test results on acid-etched glass properties.

product line descriptions

AviProtek®: non-coated bird-friendly glass with visual markers etched on the first surface.

AviProtek® E: bird-friendly glass with acid-etched visual markers on the first surface and Vitro's Solarban® high performance low-e coatings on the second surface.

Walker Textures®: full surface acid-etched glass, with etching on the first surface. Opaque, Velour and Satin finishes meet Pacific coast bird safe criteria. Opaque and Satin finishes can also be combined with Vitro's Solarban® high performance coatings on the second surface.

suggested use

Most cities on the Pacific Coast call for bird-friendly glass in the first 60' from grade. You can use AviProtek® E bird-friendly glass with low-e coating for this section, then continue with the same low-e coated glass, minus the etched markers, for the remainder of the building. This ensures visual harmony throughout the structure while meeting requirements for bird safety and thermal performance.

AviProtek® without low-e coating is a perfect choice for applications which don't need to be energy efficient, such as guardrails and spandrel, for example. It's available in the same patterns and substrates as AviProtek® E.

Walker Textures® glass with full surface etch on surface 1 can be another great choice for bird friendly and energy efficient building.

See page 17 for a list of product options.

visible light transmittance

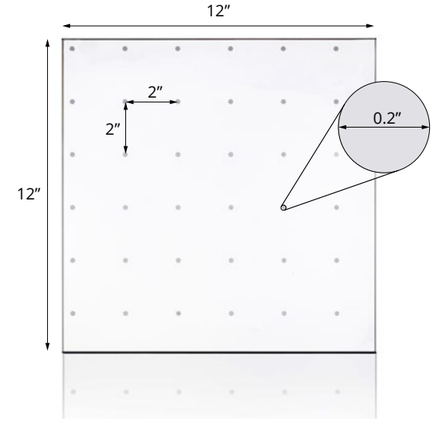
There's a common misconception that acid-etched products reduce light transmittance. That's not the case. Full surface etched glass diffuses light flow, without diminishing VLT.

See table 4 for test results on visible light transmittance.

vision and aesthetic

Architects can meet Pacific coast bird-safe building requirements without compromising on a building's aesthetic. Some AviProtek® patterns cover as little as 1% of the surface of the glass, while conforming to the 2x4 rule.

For example, please refer to the diagram on the right illustrating a 12" x 12" sample of pattern 215.



Please refer to the following sections to choose the right product for your project.

2x4 rule: see **table 1** for qualifying AviProtek® and Walker Textures® products.

Building code: see **table 5** for low-e coatings from Vitro that can meet the code. Don't forget – these coatings can be combined with AviProtek® and Walker Textures® products.

qualifying products

Many AviProtek® bird-friendly patterns and Walker Textures® finishes meet the 2x4 rule, including the examples below. Please see the AviProtek® product page for additional bird-friendly solutions.

AviProtek® patterns

For best practices in pattern selection, alignment and cutting optimization, please see our article, Bird-Safe Glass – design rules to meet your budget and minimize bird collisions.

Pattern 227 is a scattered non-directional glazing solution, to make bird-friendly design simpler than ever.

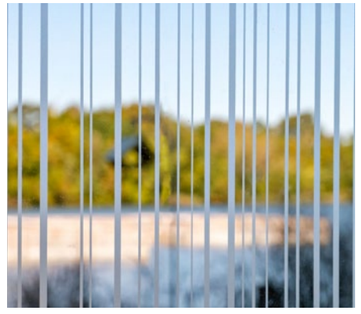
Walker Textures® full surface finishes

table 1 | patterns and finishes meeting the 2x4 rule

pattern / finish	pattern density	impact on VLT	impact on SHGC	maximum size[1]	available with Vitro low-e coating	ABC threat factor
211	22.45%	No	No	96” x 130”	yes	23
213	4.92%	No	No	96” x 130”	yes	30
214	26.56%	No	No	96” x 130”	yes	21
215	0.97%	No	No	96” x 130”	yes	25
217	1.94%	No	No	96” x 130”	yes	15
219	4.96%	No	No	96” x 130”	yes	N/A
221	0.70%	No	No	96” x 130”	yes	25
226	0.97%	No	No	96” x 130”	yes	25
227	0.70%	No	No	96” x 130”	yes	25
Opaque	N/A	No	+ 0.02	96” x 144”	yes	25
Satin	N/A	No	+ 0.01	96” x 144”	yes	25
Velour[2]	N/A	No	+ 0.03	100” x 144” 100” x 204”	no	25

1. Please note: all products that combine acid-etch with low-e coatings are available in maximum size of 96” x 130”.

2. Please note: Velour is not available with low-e coating.



The Effectiveness of AviProtek® Glass

You may be wondering how well these products work in the real world. The reports we receive from staff and occupants of bird-friendly projects are unanimous: AviProtek® patterns drastically reduce bird strikes, or eliminate them altogether.

Want to see for yourself? You can find many success stories of various projects using our options in the effectiveness of AviProtek® bird-friendly glass document.

table 2 | acid-etched glass visible light transmittance (VLT)

surface finish	glass substrate	thickness	VLT
Opaque	clear	¼” (6mm)	91%
Velour	clear	¼” (6mm)	91%
Satin	clear	¼” (6mm)	89%
Opaque	Starphire®	¼” (6mm)	93%
Velour	Starphire®	¼” (6mm)	92%
Satin	Starphire®	¼” (6mm)	90%

1. Figures may vary due to manufacturing tolerances. All tabulated data is based on NFRC methodology using the LBNL’s Window 5,2 software.

2. Transmittance values based on spectrophotometric measurements and energy distribution of solar radiation.

acid-etched glass properties

The following charts outline essential properties of AviProtek® and Walker Textures® acid-etched glass, based on extensive testing. Since these patterns and finishes are acid-etched directly into the surface of the glass without adding any other substance, their appearance will not degrade or change over time. This, along with their formidable strength and resistance to wear, makes them particularly well suited to use on exterior surfaces.

AviProtek® visual markers and Walker Textures® full surface finishes are acid-etched directly onto the surface of the glass, so their appearance will not change or degrade over time.

table 3 | acid-etched glass strength properties

test / standard		Satin tempered: ¼" (6mm)		unetched tempered: ¼" (6mm)
modulus of rupture	**ASTM-C158**[1]	etched surface in tension	unetched surface in tension	
max load (lbs)		357	351	338
flexural strength (psi)		1,070	1,050	1,000
modulus of rupture (psi)		28,720	28,370	26,720

table 4 | acid-etched glass resistance properties

test / standard		Opaque	Velour	Satin	float	unit of measure
resistance to wear	**ASTM-C501**[2]	213	210	198	183.29	abrasive wear index (Ix)
resistance to staining	**ASTM-C1378**[3]	A	A	A	A	classification
scratch hardness	**Mohs**[4]	5	5	6	5.5	out of 10

1. *Modulus of rupture: ASTM-C158*
   ASTM C158 is a common guideline for bend testing on glass and glass-ceramics. When executed properly, the modulus of rupture from this test method is considered a valid measure of tensile strength. Higher scores indicate greater tensile strength.
2. *Resistance to wear: ASTM-C501*
   This test method covers the establishment of an abrasive wear index by determining the loss of weight resulting from abrasion of unglazed ceramic tile by Taber Abraser. Higher scores indicate greater resistance to wear.
3. *Resistance to stain: ASTM-C1378*
   This test method details the standard procedures for determining the resistance to staining of ceramic tile surfaces. After exposure, the surface is cleaned in a defined manner, and the test specimens are inspected visually for change. Higher scores indicate greater resistance to stains.
4. *Scratch Hardness: Mohs scale*
   This test compares the resistance of a mineral to being scratched to ten reference minerals, known as the Mohs Hardness Scale. Higher scores indicate greater resistance to scratches.

AviProtek® bird-friendly glass

AviProtek®

- **Thicknesses:** 1/8" to 1/2" (3mm to 12mm).
- **Dimensions:** standard 96" x 130". On demand 72" x 130" or 84" x 130".
- **Substrates:** Clear and Starphire Ultra-Clear™ glass by Vitro. Tints are available on demand.

AviProtek® E

- **Thickness:** 1/4", 5/16", 3/8" (6mm, 8mm, 10mm).
- **Dimensions:** standard 96" x 130". On demand 72" x 130" or 84" x 130".
- **Substrates:** Clear and Starphire Ultra-Clear™ glass by Vitro. Tints are available on demand.
- **Energy:** to meet Pacific coast energy requirements, choose the appropriate Vitro high performance coating on surface 2.

Walker Textures® full surface acid-etched glass

Opaque

- **Thicknesses:** 1/8" to 3/4" (3mm to 19mm).
- **Dimensions:** Standard 96" x 130". Other dimensions are available on request.
- **Substrates:** Clear, low-iron, bronze, grey, blue and black.
- **Surface:** Available on both sides from 3mm to 19mm – subject to minimum quantity.
- **Energy:** When combined with Vitro's Solarban® coatings on surface 2, the glass is available in 6mm in standard size of 96" x 130".

Satin

- **Thicknesses:** 1/8" to 3/4" (3mm to 19mm).
- **Dimensions:** Standard 96" x 130". Other dimensions are available on request.
- **Substrates:** Clear, low-iron, bronze, grey, blue and black.
- **Surface:** Available on both sides from 3mm to 8mm – subject to minimum quantity.
- **Energy:** When combined with Vitro's Solarban® coatings on surface 2, the glass is available in 6mm in standard size of 96" x 130".

Velour

- **Thicknesses:** 1/8" to 3/4" (3mm to 19mm).
- **Dimensions:** Standard 96" x 130". Also available in 100" x 144".
- **Oversize:** The Velour finish is available in oversize dimensions of 100" x 168" and 100" x 204". These sizes are available in clear and low-iron glass, with the etching on one side only.
- **Substrates:** Clear, low-iron, bronze, grey, blue and black.
- **Surface:** Available on both sides from 3mm to 19mm – subject to minimum quantity.
- **Energy:** The Velour finish is *not available* with low-e coatings on surface 2.

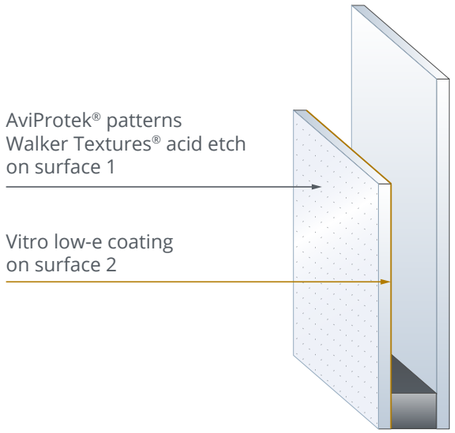
AviProtek® E

with Vitro solar control coatings

Walker Glass has partnered with Vitro Architectural Glass to develop a uniquely energy-efficient line of bird-friendly architectural glass.

AviProtek® + Solarban® = AviProtek® E

Walker and Vitro Architectural Glass worked closely to combine the Solarban® family of solar control glass with acid-etched visual markers, creating the groundbreaking AviProtek® E. Uniting the AviProtek® acid-etched bird friendly patterns with the industry's most trusted brand of low-e coatings, AviProtek® E glass offers architects and building owners an unsurpassed combination of avian protection and code compliance for daylighting, solar control and insulating performance.



about Vitro

Vitro Architectural Glass (formerly PPG Glass) is part of Vitro, North America's largest glass producer. It is exclusively dedicated to glass innovation and fueled by the same people, plants and products that have made PPG Glass one of the industry's most respected and reliable commercial glass manufacturers.

According to a recent study conducted by Dodge Data Analytics, Vitro products are the most commonly specified brand of commercial glass in the industry. Operating under a global company exclusively committed to glass, architects and customers can expect accelerated research and development, in addition to greater capacity.

Learn more at vitroglazings.com

Vitro thermal performance

Solarban® glass is a spectrally selective glass option which reduces long and short wave (infrared) heat energy, while at the same time transmitting visible light through the glass. Solarban® glass products by Vitro Architectural Glass let you specify large spans of glass that maximize natural daylighting without sacrificing thermal efficiency.

With a range of options, the Solarban® family of glass products features a clear aesthetic with some of the highest light-to-solar gain (LSG) ratios in the industry.

table 5 | Vitro solar control coatings

basic configurations[1]	VLT	SHGC
clear glass + clear glass	79	0.70
clear glass with Solarban® R67 (2) + clear glass	54	0.29
clear glass with Solarban® 70 (2) + clear glass	64	0.27
Acuity™ glass with Solarban® 72 (2) + clear glass	67	0.28
clear glass with Solarban® 90 (2) + clear glass	51	0.23

Due to the low density of AviProtek® patterns, they have no significant impact on the above values.

1. *Please note that due to their highly reflective surfaces, we do not recommend combining the following coatings with AviProtek® visual markers for bird deterrence purposes:* **Solarban® R77** *and* **Solarban® R100**.

SOLARBAN® R67 Solar Control Low-E Glass
SOLARBAN® 70 Solar Control Low-E Glass
SOLARBAN® 72 Solar Control Low-E Glass
SOLARBAN® 90 Solar Control Low-E Glass

University of Minnesota Bee Research Center, St. Paul, MN

- **Glass:** AviProtek® E 6mm clear glass with pattern 215 on surface 1 and Solarban® 70 on surface 2
- **Bird Deterrence:** 5mm dots, 2x2in spacing. Meets 2x4 rule.

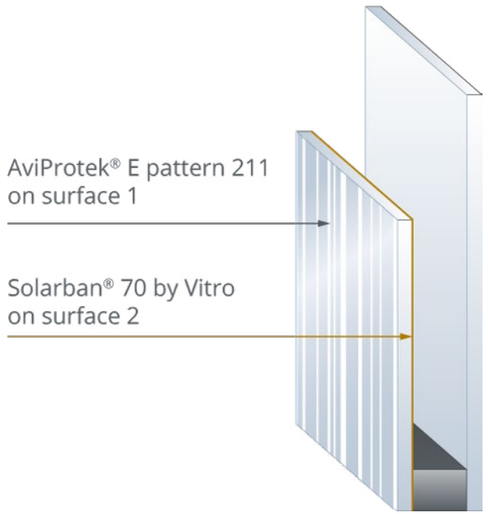
case study: Oregon Zoo

Education Center

LEED® Platinum, Net Zero

New structures must meet rigorous criteria for bird deterrence and energy conservation while maintaining good VLT levels. AviProtek® E bird deterrent glass with a low-e coating is able to meet these demands, as well as the project goals for the Oregon Zoo's new Education Center.

Built in 2016, the Education Center punches above its weight in sustainability, performance and use of daylighting. Throughout the Center, Opsis Architecture used AviProtek® E bird-friendly glass in pattern 211, which conforms to the 2x4 rule. A low-e coating on the second surface of the glass minimizes energy waste and helps the project meet its ambitious sustainability goals.



selected awards

Here are a few of the many honors awarded to the Oregon Zoo's Education Center.

- **2019:** AIA, COTE Top Ten Green Building Award
- **2018:** AIA Portland, 2030 Award
- **2017:** DJC Top Projects, Energy Trust of Oregon High Performance Building Award, New Construction

see the full list at **opsisarch.com**

performance

Despite a limited budget, the Oregon Zoo Education Center was designed to aim high. The building needed LEED® Silver status to meet its green building code requirements, but the Zoo aspired to achieve LEED® Gold.

In the end, they made Platinum.

So how did they do it? Through a series of workshop sessions and consultations with zoo staff, the architectural team came up with all sorts of creative ways to optimize the building's effectiveness. Solutions include low-e coated glazing to minimize SHGC on hot days and heat loss in the winter. In fine weather, classrooms open up with full-height sectional sliding doors, also glazed with AviProtek® E. This energy efficient and bird-friendly touch goes above and beyond standard requirements, but it fits perfectly with the project's concept.

As Heather DeGrella, Opsis Architecture's Sustainability Director, explained, "It's about the small things."

Small things like this have a big impact on the space's performance, helping it to stand out and earn its impressive credentials.

Here are some of the ways that AviProtek® E contributed to LEED® Platinum status for the Oregon Zoo Education Center under BD+C: New Construction (v2009).

LEED® credits awarded to the Oregon Zoo Education Center

relating to its use of AviProtek® E bird-friendly, low-e coated glass

credit	description	points earned
EAc1, Optimize Energy Performance	received all 19 points through a variety of strategies, including building envelope, of which the glazing is part	19
EQc8.1	Daylight, for 75% of spaces	1
EQc8.2	Views, for 90% of spaces	1
Innovation Credit	Bird Collision Deterrence	1
Innovation Credit	Building Education. The visible pattern on the glazing in conjunction with signage contributes to this credit, which requires a public education component related to the sustainable attributes of the building.	1

bird-friendly glazing

The Oregon Zoo and Opsis Architecture overcame several challenges when designing the Center to be safe for birds. The structures are a pair of single story buildings, so the glass surfaces are entirely within the danger zone for avian strikes. Located in a forested zoo setting, the site is surrounded by trees full of local birds. As we know, this creates a risk for collisions because trees cast reflections onto nearby windows and can create inviting yet deadly illusions for birds nearby.

Furthermore, it was important that the buildings' design connect visitors with nature as much as possible. With this in mind, Opsis needed a glazing solution that would deter bird strikes without impeding the view from inside.

connecting with nature

Opsis Architecture and the Oregon Zoo considered several glazing options when they were planning the Education Center. Initial concepts used a combination of patterns and some unetched glass, but input from zoo employees brought AviProtek® E pattern 211

According to Oregon Zoo staff in charge of overseeing this building, **there have been no bird strikes since its completion**.

"The zoo came back and said, 'Why don't we use [pattern 211] everywhere? The staff in the admin offices feel like they've been left out because they don't have it in their area.' "

Heather also related staff and visitor feedback about the patterned glass gathered during a post-occupancy follow up. The vertical lines made some people think of gentle rain, evocative of Oregon's natural environment. Others imagined they were looking out through tall grass, which helped them to identify with the zoo's animals and the surrounding ecosystem. Instead of cutting people off from the environment, the patterned glass actually enabled connection.

Although patterned glass was chosen initially to meet bird deterrent requirements, it quickly emerged as a key component of the building's aesthetic.

Many thanks to Heather DeGrella of Opsis Architecture for her help in writing this case study.

- **Glass:** AviProtek® E 6mm clear glass with pattern 211 on surface 1 and Solarban® 70 on surface 2.
- **Bird Deterrence:** Varied vertical stripes. Meets 2x4 rule.
- **VLT:** 64%
- **SHGC:** 0.27

case study: National Aviary

Tropical Rainforest

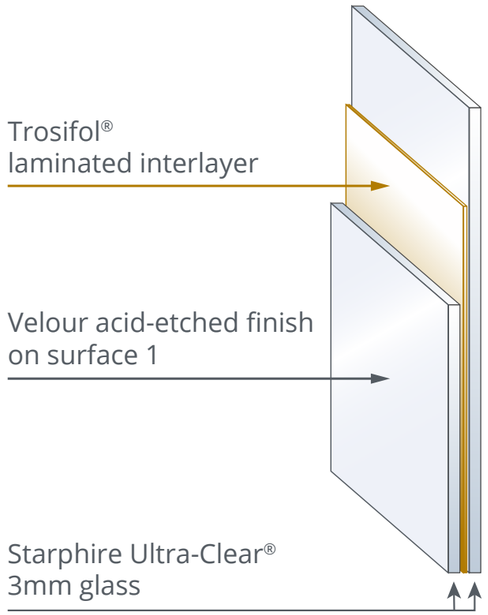
Full surface acid etched glass can be an excellent way to deter bird collisions. Adaptable treatments like these can provide the perfect solution for buildings with unusual and highly specific needs, like the recently renovated Tropical Rainforest Habitat at the National Aviary in Pittsburgh, Pennsylvania.

a well-deserved renovation

In the summer of 2018, this legacy structure received a thorough update, including a new skin. The habitat still had its original glazing and boiler system from 1952, and it was due for some updates. New cladding would improve its energy efficiency, lighting, and the wellbeing of its inhabitants. After careful consideration, the National Aviary team selected Starphire Ultra-Clear® glass from Vitro Glass with Velour acid-etched finish from Walker Textures® to rejuvenate the Tropical Rainforest building.

The new glazing was designed to optimize natural daylighting and UV transmittance, for the benefit of the greenery within. At the same time, it was important to avoid harsh glare or uncomfortable heat for staff, visitors and the exhibit's birds. One of the strengths of acid-etched glass is that it effectively manages light flow without restricting visible light transmittance. Last, but certainly not least, the glazing had to be bird-friendly to prevent collisions, both from within and without.

To increase UV light flow, the glass was laminated with an interlayer of Trosifol® Natural UV from Kuraray. This laminate was developed for specific applications including zoos, greenhouses, conservatories, and other areas which benefit from full spectrum light, so it increases transmittance of natural ultraviolet (UV) light. This quality sets it apart from most safety glass interlayer technologies. Dlubak Specialty Glass fabricated the glass in custom bent panes, giving the structure a sleek, modern finish. These 3,146 panes were installed in the early summer, and by July the space was ready for visitors, birds and staff.



new look, new light, new life

The Tropical Rainforest had a big job to do. As Conor McGarvey, the Director of Buildings and Grounds explained, the first consideration is the wellbeing of the birds and greenery inside. At the same time, it's important for staff and visitors to feel welcome and comfortable. The new glass has risen to both challenges.

Sam Moore, the Aviary's Director of Guest Operations, described visitors' response to the new environment. He said, "We regularly hear from visitors who haven't been to the Aviary [since the renovations], who are blown away not only by how bright it is, but by how lush it is."

Conor McGarvey underlined the impact of the light on plants, saying, "I'm frankly impressed and amazed at the amount of growth we have in there."

He noted that the birds enjoy this impressive canopy growth, which lets them sun themselves high up to catch the most warmth from the sun.

While the new glass lets in an abundance of daylight, both team members agreed that the light is bright but not at all harsh. Whether they're educating visitors or tending to birds and trees, the Aviary's staff can go about their work in perfect comfort.

bird strikes

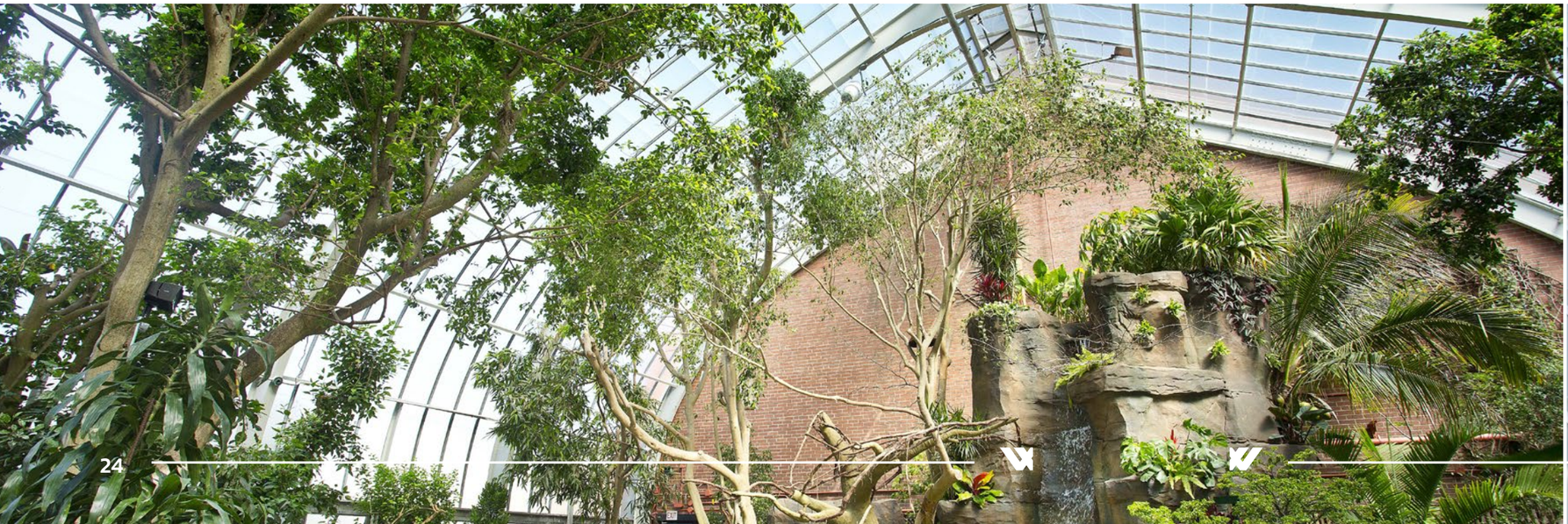
The Tropical Rainforest is a densely forested habitat full of birds, set into forested surroundings which are also full of birds. Handled improperly, this building could have been a hotbed for bird strikes. The Aviary's staff was acutely aware of the risk, which is why they chose bird-friendly acid-etched glass for the remodel.

In the years since the new glass was installed, staff have monitored the site closely for bird strikes.

They haven't seen a single collision.

Many thanks to the National Aviary for their help in writing this case study.

Architect: Montgomery Smith-Inc.



- **Glass:** Starphire Ultra-Clear™ glass with Velour on surface 1
- **Bird Deterrence:** Full surface etch. Meets 2x4 rule.
- **VLT:** 92%

projects

- **Glass:** 6mm Starphire Ultra-Clear™ glass with Velour on surface 1, laminated to 2 other glass substrates
- **Bird Deterrence:** Full surface etch. Meets 2x4 rule.

Aquarium of the Pacific, Long Beach, CA

Cedar River

Municipal Watershed Headquarters

Seattle, WA

The City of Seattle's Cedar River Municipal Watershed Headquarters supports the work of Seattle Public Utilities to protect the ecological health of the region's water supply. AviProtek® bird-friendly glass with low-e coating on surface 3 contributed to this building's LEED® Gold certification.

- **architectural firm:** Schacht Aslani | see the project
- **glass:** AviProtek® 6mm clear glass with pattern 221 on surface 1 and Solarban® 70 on surface 3

- **Bird Deterrence:** 6mm dots, 2x4in spacing. Meets 2x4 rule.
- **VLT:** 64%
- **SHGC:** 0.36

Aquarium of the Pacific

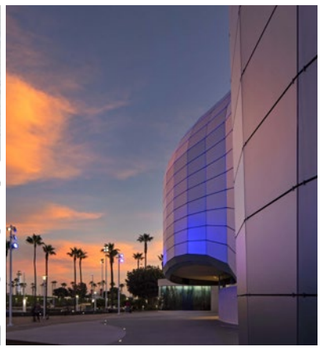
Pacific Visions Expansion

Long Beach, CA

The Aquarium of the Pacific displays 12,000 creatures and over 100 exhibits that celebrate the planet's largest and most diverse body of water – the Pacific Ocean. The exterior structure is as breathtaking as the interior, with a stunning use of glass that covers much of the building and gives it a flowing look reminiscent of the ocean.

- **Architectural firm:** EHDD | see the project
- **glass:** 6mm Starphire Ultra-Clear™ glass with Velour on surface 1, laminated to 2 other glass substrates

- **Bird Deterrence:** Full surface etch. Meets 2x4 rule.



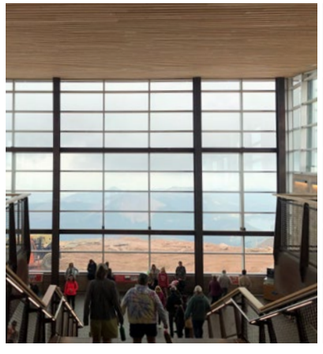
Pikes Peak Summit

Visitor Center

Pikes Peak, CO

Pikes Peak is located on the eastern side of the Rocky Mountains, in Colorado. The Summit House features AviProtek® E glass, a bird deterrent solution with acid-etched linear patterns on surface 1 to protect local wildlife. A Solarban® 70 low-e coating from Vitro Architectural Glass on surface 2 improves the building's energy performance.

- **architectural firm:** RTA | see the project
- **glass:** AviProtek® 6mm clear glass with pattern 213 on surface 1 and Solarban® 70 on surface 2.
- **Bird Deterrence:** Horizontal stripes, 2in spacing. Meets 2x4 rule.
- **VLT:** 64% | **SHGC:** 0.27

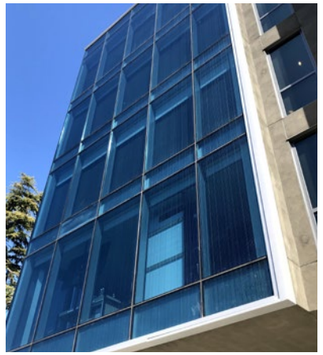


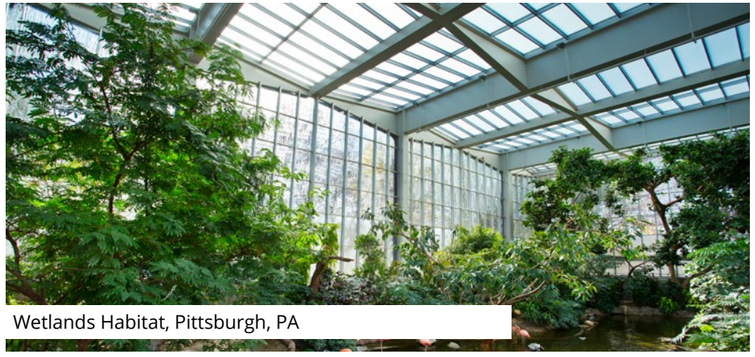
noteworthy mentions

Here are additional examples of bird-friendly buildings made with AviProtek® solutions.

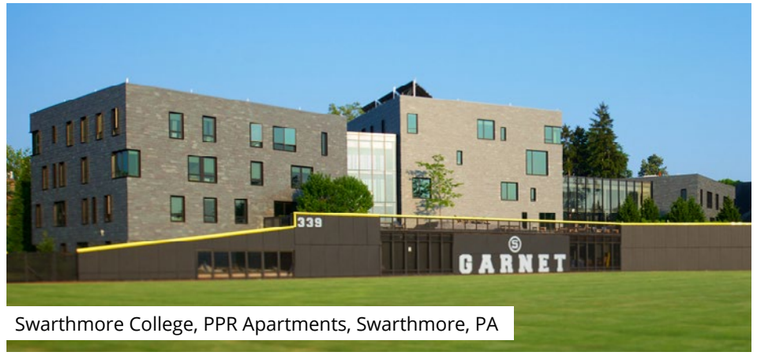
Click through to find all the project details on our site.

Shashi Hotel, Mountain View, CA

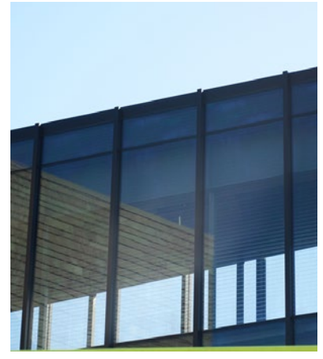




Wetlands Habitat, Pittsburgh, PA



Swarthmore College, PPR Apartments, Swarthmore, PA



sustainable materials

To see real progress in the building industry, companies need to adopt responsible practices throughout the supply chain. Over the last few years experts have become increasingly aware of the effects of a structure's materials on its builders and occupants, leading to progressive legislation such as California's Bill AB 262.

AB 262 / Buy Clean California

As of January 2020, California's building legislation requires bidders on public works projects to provide Environmental Product Declarations (EPD) for flat glass products to be installed in upcoming projects. Flat glass as defined by AB 262 is not typically installed in buildings, and the bill does not cover processed glass applications such as cut-to-size panes. Nonetheless, EPD documents are important for the sake of the transparency they bring to the manufacturing process.

Learn more about the Buy Clean California Act

Walker offers EPD and HPD® documentation for AviProtek® and Walker Textures® glass products.

EPD and HPD®

Building sustainably is a multifaceted endeavor which goes beyond bird deterrence. Eco-friendly products with third-party verification such as HPD® and EPD give building professionals at every level a reliable, standardized tool to select the ideal product for their projects. They also contribute to green building certifications such as WELL, Green Globes, BREEAM and LEED® v4.

AviProtek® glass and Walker Textures® glass come with HPD® and EPD transparency reports prepared by Vertima, accredited experts in green building and LEED® certification. The EPD have Type III verification and are registered in accordance with certification requirements for ISO standard 14025:2006.

- **EPD (Environmental Product Declaration):** a report describing a product's potential environmental impact according to the life cycle assessment (LCA) criteria and in conformity with ISO protocol 14025.
- **HPD® (Health Product Declaration®):** a declaration that discloses a product's chemical ingredients and their associated effects on health.

About Vertima

Vertima is recognized for its leading edge expertise in materials and green building certifications. Founders Josée Lupien and Jean DesRosiers lead a team of experts in green building practices. Together, they support manufacturers and stakeholders in their green building projects, especially when aiming for LEED® certification.

Learn more at vertima.ca

LEED® credits contribution

with AviProtek® and Walker Textures® glass

Walker glazing products can contribute toward many different credits under LEED® v.4.1, maybe more than you realize. Table 6 lists credits which can be attained with the help of Walker Textures® and AviProtek® glass under LEED® BD+C: New Construction.

For details on LEED® v4.1 certification using Walker Glass, please see our article: Designing for LEED® Credits with Walker Glass Products.

table 6 | LEED® v4.1 credits with Walker products

LEED® BD+C: New Construction v4.1

category	credit name	option	credits available
Energy and Atmosphere	Optimize Energy Performance[1]	Option 1. Energy Performance Compliance	18
Materials and Resources	Environmental Product Declarations	Option 1. Environmental Product Declaration (EPD)	1
	Material Ingredients	Option 1. Material Ingredient Reporting	1
Indoor Environmental Quality	Low-Emitting Materials	n/a	3
	Thermal Comfort[1]	n/a	1
	Daylight	Option 1. Simulation: Spatial Daylight Autonomy and Annual Sunlight Exposure	3 (2 for Healthcare)
		Option 2. Simulation: Illuminance Calculations	
		Option 3. Measurement	
	Quality Views	n/a	1
Innovation	Innovation	Option 1. Innovation	1
		Option 2. Bird Collision Deterrence credit	1
		Option 3. Additional Strategies	3

1. Available for AviProtek® E and Walker Textures® glass with a Solarban® low-e coating from Vitro on surface 2.

Innovation: Bird Collision Deterrence

This credit aims to reduce bird injury and mortality due to collisions with buildings.

Projects can earn the credit by using bird deterrent façade materials such as AviProtek® bird-friendly glass and Walker Textures® acid-etched glass with full surface treatment. Qualifying products can be determined with calculations using Threat Factor ratings.

samples, specifications and education

samples program

AviProtek® samples box

You are probably looking at different bird-friendly options and want to see what they're like in person. The AviProtek® sample box, dedicated solely to bird-friendly glass solutions, is a perfect way to start.

The AviProtek® sample box contains the most comprehensive bird-friendly sample selection on the market and will meet your every need. Please feel free to order your box and see all the possibilities that are at your fingertips.

Order your samples

Walker offers a comprehensive sample program to support our bird-friendly product lines.

- AviProtek® sample kit
- 12" x 12" monolithic samples
- 12" x 12" IGUs (insulated glass units) with Solarban® high performance coatings on surface 2 or 3
- Full size mock-ups

product specifications

These three part specifications are a tool for architects, designers and specification writers to communicate exactly which finishes, translucencies and substrates they want in their projects. Walker Glass carries ISO 9001:2015 certification, and strives to provide the highest possible quality assurance. When architects and designers specify Walker glass, they can be sure that they are choosing high performance acid-etched glass and mirror products that will look great for years to come.

The Walker Architectural Glazing Guide Specs include all pertinent information on our full surface and bird-friendly glass, as pertains to Master Format Section 08 81 00.

It is recommended that architects clearly state their product performance expectations in the specifications for every project, including etched patterns on surface 1. It is also best to indicate your expectations regarding glass strength, resistance to scratch and stain, visible light transmittance, and any other relevant performance indicators.

Download the specification documents

e-books of bird-friendly glass

For more information about bird-safe building in Canada and the United States, please see our other titles in this series.

- the AviProtek® **United States** e-book of bird-friendly glass
- the AviProtek® **New York City** e-book of bird-friendly glass
- the AviProtek® **Canada** e-book of bird-friendly glass
- the AviProtek® **Toronto** e-book of bird-friendly glass

education

AIA accredited courses

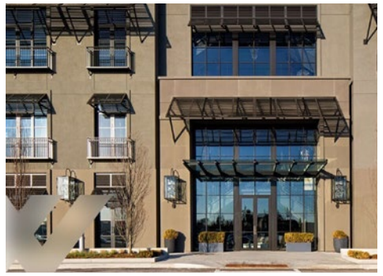
Walker offers three accredited courses, including one titled “Bird-Friendly Glazing Challenges and Solutions” to architects, designers and specifiers. Book your training session to discover creative, yet eminently practical ways that you can use bird-friendly and acid-etched glass products.

Learn more

bird-safe glass explained

World renowned ornithologist Dr. Daniel Klem introduces and explains the multifaceted issue of bird deterrence. Each episode focuses on specific aspects of the phenomenon, from the causes to potential solutions and what has already been done to reduce bird strikes.

Watch the videos



technical papers

White papers by Dr. Klem, professor of ornithology and conservation biology at Muhlenberg College.

- the building industry and bird conservation
- legislative measures promoting bird-friendly buildings
- technical design of bird-friendly glass

Read the white papers

blog posts

Educational articles and case studies highlighting best practices for working with bird-friendly glass, energy efficient glass, sustainable materials and more. These articles are readily available to you on the Walker Glass website.

Read the blog

contact us

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Walker’s North American architectural managers are here to support you at every step of your design process. Please refer to the list below to find the architectural manager for your area.

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Don’t miss a beat! Subscribe to our monthly newsletter.

Thank you for helping the glass industry work toward a safer, more sustainable built environment.

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