the AviProtek® New York City e-book of bird-friendly glass

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second edition

preface

Thanks for your time and attention. The goal of AviProtek® New York City 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 New York City 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 remodelled 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.

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. Legislation such as New York City's Local Law 15 is a step 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:**
  3mm Starphire with full-surface Velour finish on surface 1
  3mm and 5mm Starphire with AviProtek® pattern 214 on surface 1
- **Threat factors:**
  pattern 214: 21
  Velour full-surface etch: 25

National Aviary Wetlands Habitat, Pittsburgh, PA

local law 15:
NYC bird-friendly legislation

bird deterrence legislation

To reduce the number of bird deaths due to collisions with building glass, the New York City Council passed NYC Local Law 15 which establishes new requirements for installation of **B**ird-**F**riendly **M**aterials (i.e. **BFM**). These requirements are referenced in The Bird-Friendly Building Design and Construction Requirements Guidance Document (located at Bird-Friendly; nyc.gov) and the NYC Building Code section 1403-8.

The New York City Building Code (sec.1402.1) defines **B**ird **H**azard **I**nstallation (**BHI**) as Monolithic glazing installations that provide a clear line of sight on the exterior of buildings including but not limited to:

a. In New Design and Construction of exterior glazing, BHI is defined as any Glass windows, Glass awnings, Glass hand rail & guards, Glass wind break panels and Glass acoustic barriers. The NYC Building Code requires BHI to be constructed of BFM regardless of height.

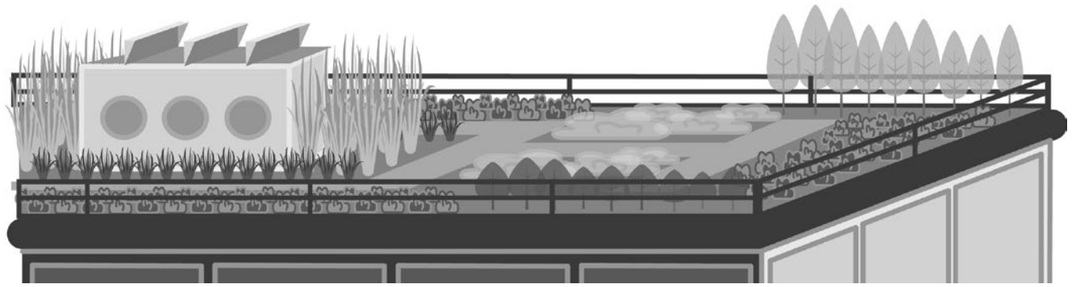
b. In Alterations of an existing building - under sub-section AC28-101.4.3 exception-20 – it is mandated that where the building includes the replacement of all exterior glazing then said glazing will be replaced with bird-friendly materials.
   - Where all exterior glazing is being replaced and the scope of works includes the installation of green roof systems or Bird Hazard Installations such as glass noted above, the work will require Bird-Friendly Materials.
     - » Alterations work that impacts only a portion of a building and does not involve all exterior glazing will not be subject to LL15 requirements.

c. Compliant Bird-Friendly Materials must have a **t**hreat **f**actor (**TF**) of 25 or less in accordance with the ABC bird collision deterrence material threat factor reference standard (or with the ABC BF materials evaluation program at Carnegie Museum's Avian Research Center test protocol or relevant ASTM standard). The current TF referenced standards can be found at https://abcbirds.org/glass-collisions/nyc-threat-factor.

d. BFM are required to be installed **from grade to 75' above grade** for both the exterior wall envelope and when fly through conditions are created in the following circumstances:
   1. When a distance between parallel glass is 17' or less.
   2. Within 12' from a corner where there is a convergence of two glass sides creating a perpendicular, acute, or obtuse corner.
   - (Exception - The 10 Sq. Ft Allowance allows the use of 10' sq. ft. of non-BFM exterior wall in the first 75' above grade.)

e. Where ground floor transparency is required by the NYC Zoning Resolution, transparent BFM with a UV reflective pattern and a maximum TF of 27 shall be provided.

f. New Exterior wall envelope and associated openings adjacent to a green roof system (which installation meets requirements of Chapter 15 of the NYC Building Code) will be required to use BFM up to 12' vertically from the walking surface and shall be constructed with BFM up to 12' above the walking surface.



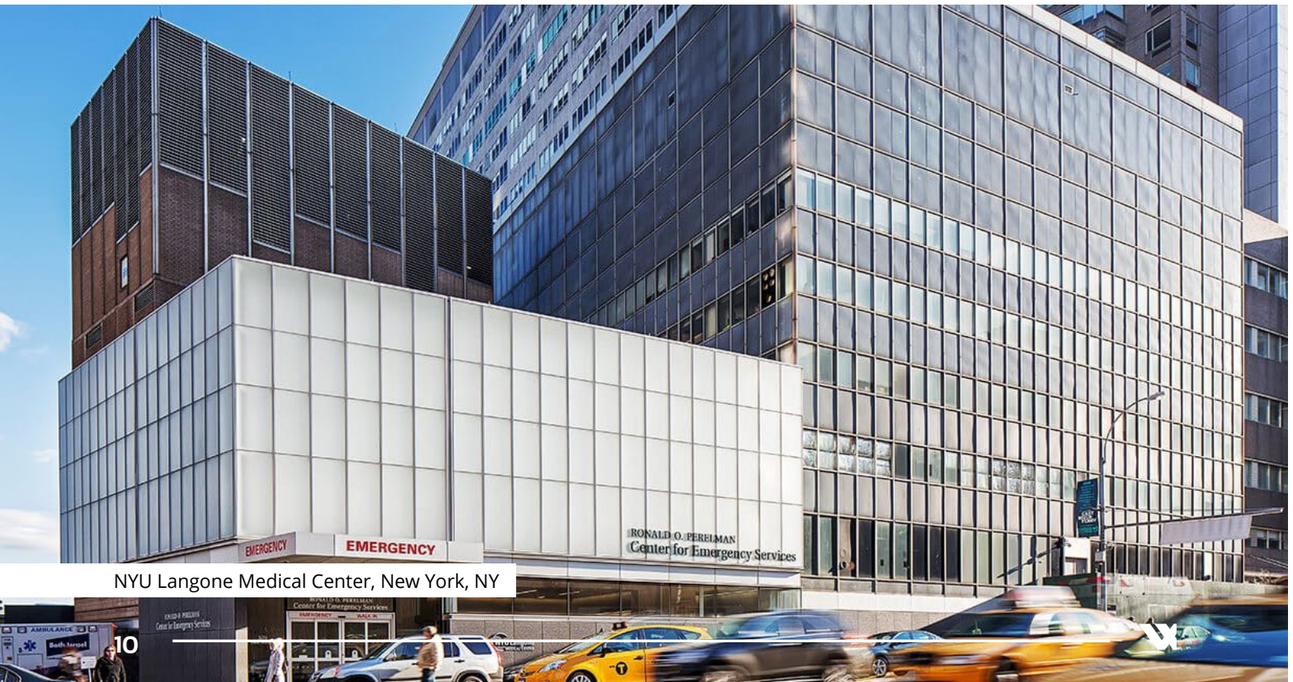
NYC building code

In addition to bird deterrence standards such as Local Law 15, architects and building owners must make sure to satisfy energy efficiency requirements. This section illustrates the integrated approach needed to meet bird-friendly building legislations as well as thermal performance requirements.

NYC building code: glazed code performance

Legislators in New York City recently updated the New York City Energy Conservation Code (NYCECC) to incorporate more stringent glazing and building insulation requirements. Now current with the 2020 Energy Conservation Construction Code of New York State (ECCCNYS), the NYCECC went into effect on May 12, 2020.

In addition to being based on the 2018 International Energy Conservation Code (IECC) and ASHRAE Standard 90.1-2016, the NYCECC now mimics the New York State Energy Research and Development Authority (NYSERDA) NYStretch Energy Code-2020, which was formally adopted by New York City Council on March 29, 2020.



NYU Langone Medical Center, New York, NY

Noteworthy updates

The most noteworthy updates to the NYCECC include:

- Additional thermal envelope performance requirements for buildings attempting code compliance via energy modelling.
- More stringent insulation and fenestration requirements for most types of fenestration assemblies.
- Permission to use source energy as a metric (instead of energy cost) for buildings attempting code compliance via energy modeling.
- Whole building energy monitoring on commercial buildings.

The new U-factor and SHGC mandates are as follows:

- Curtain walls (fixed): U-0.36, SHGC-0.36
- Fixed metal windows (below 95 feet): U-0.30, SHGC-0.36
- Fixed metal windows (above 95 feet): U-0.36, SHGC-0.36
- Operable windows (above 95 feet): U-0.40, SHGC-0.36
- Operable windows (below 95 feet): U-0.42, SHGC-0.36
- Non-framed metal windows: U-0.28

Among the more stringent insulation requirements referenced above are reduced U-factors and more rigorous solar heat gain coefficients (SHGC) for fenestration, as well as newly established default U-factors for spandrel glass assemblies.

Additional code requirements

Additional code requirements related to glass/glazing are as follows:

- Visible light transmittance (VT/VLT) for vertical fenestration must be greater than or equal to (≥) 1.1 times the SHCG, as mandated in ASHRAE 90.1-2016.
- Windows at higher elevations will require more structural support/framing.
- Thermal bridge documentation must be provided for all new construction, including commercial and residential buildings.

Read on to discover the multiple solutions now available with AviProtek® glass. These product lines, along with Solarban® coatings by Vitro (table 5), can help projects meet New York City's newly established glazing requirements related to insulation and bird safety.

Please note that the ECCCNYS code does not place any direct limit on window-to-wall ratio. Instead, the code uses "envelope backstops" that don't necessarily reduce window-to-wall ratio, but limit how much high efficiency HVAC, lighting and hot water systems can be used as trade-offs against the building envelope components such as spandrel or window and wall areas. Although these new backstops will not be in ASHRAE or IECC codes, they are being enacted in New York City.

AviProtek® bird-friendly glass

solutions for New York City

Local Law 15 requires that glass have an ABC (American Bird Conservancy) threat factor of 25 or less, to be considered safe for birds. A number of AviProtek® patterns meet this criterium, as do three variations of 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 conditions. 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 Local Law 15 criteria. Opaque and Satin finishes can also be combined with Vitro's Solarban® high performance coatings on the second surface.

suggested use

Local Law 15 mandates that new buildings use bird-friendly glass in the first 75' 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

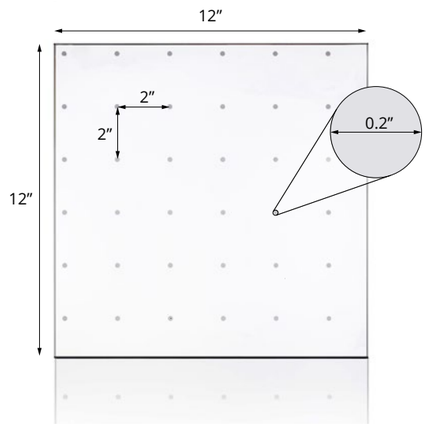
There's a common misconception that acid-etched products reduce light transmittance. That's not the case. Full surface etched glass diffuses light flow, without diminishing VLT.

See table 4 for test results on visible light transmittance.

vision and aesthetic

Architects can meet New York's 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 meeting Local Law 15 requirements.

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.

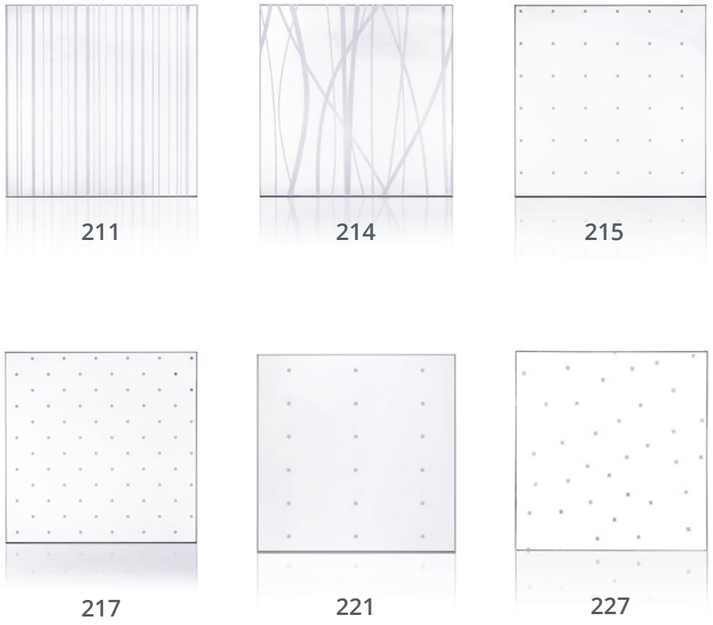
Local Law 15: see **table 1** for qualifying AviProtek® and Walker Textures® products.

NYCECC: 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

AviProtek® bird-friendly patterns and Walker Textures® finishes meeting NYC Local Law 15 requirements

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 local law 15

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

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.

product availability

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 New York City Energy Conservation Code (NYCECC) 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 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 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.

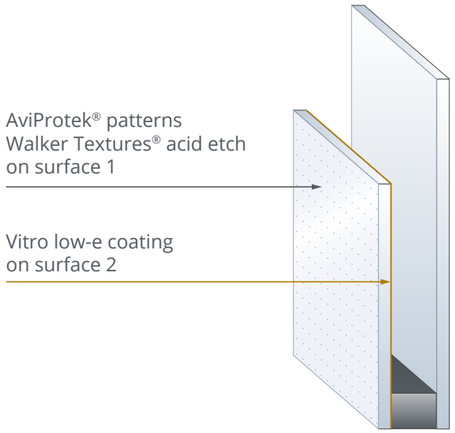
AviProtek® E

with Vitro solar control coatings

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

AviProtek® + Solarban® = AviProtek® E

Walker and Vitro worked closely to combine the Solarban® family of solar control glasses 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 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

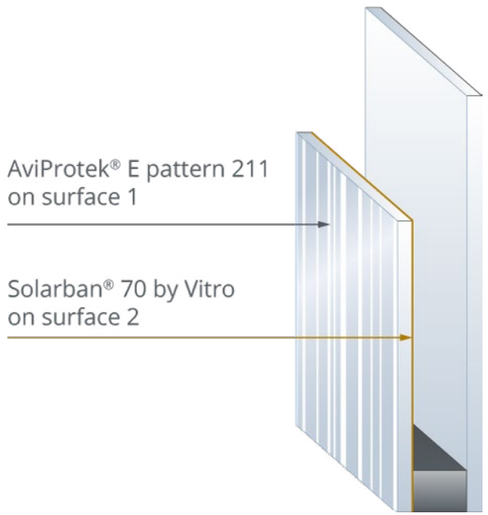
case study: Oregon Zoo

Education Center

LEED® Platinum, Net Zero

To satisfy Local Law 15 and the updated NYCECC, 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 was 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 surpasses Local Law 15 requirements for bird-friendly glazing. 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 into every part of the project. Heather DeGrella described the conversation for us.

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.
- **Threat factor:** 23
- **VLT:** 64%
- **SHGC:** 0.27

case study: National Aviary

Tropical Rainforest

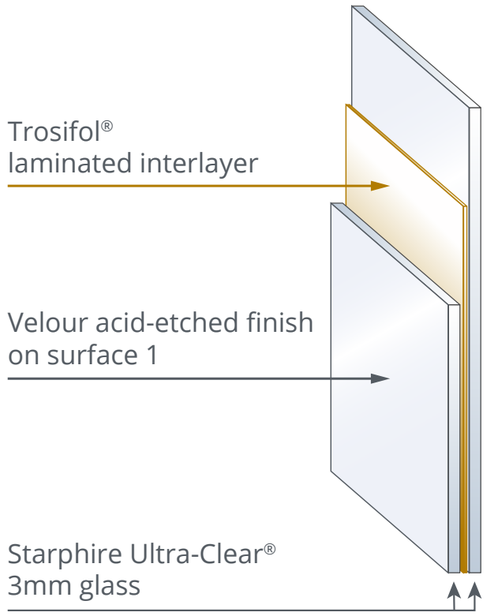
Full surface acid etched glass can be an excellent way to meet Local Law 15 requirements for bird-friendly glass. Adaptable treatments like these can provide the perfect solution for buildings with unusual and highly specific needs, like the recently renovated Tropical Rainforest Habitat at the National 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 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 SentryGlas® Natural UV from Trosifol®. 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

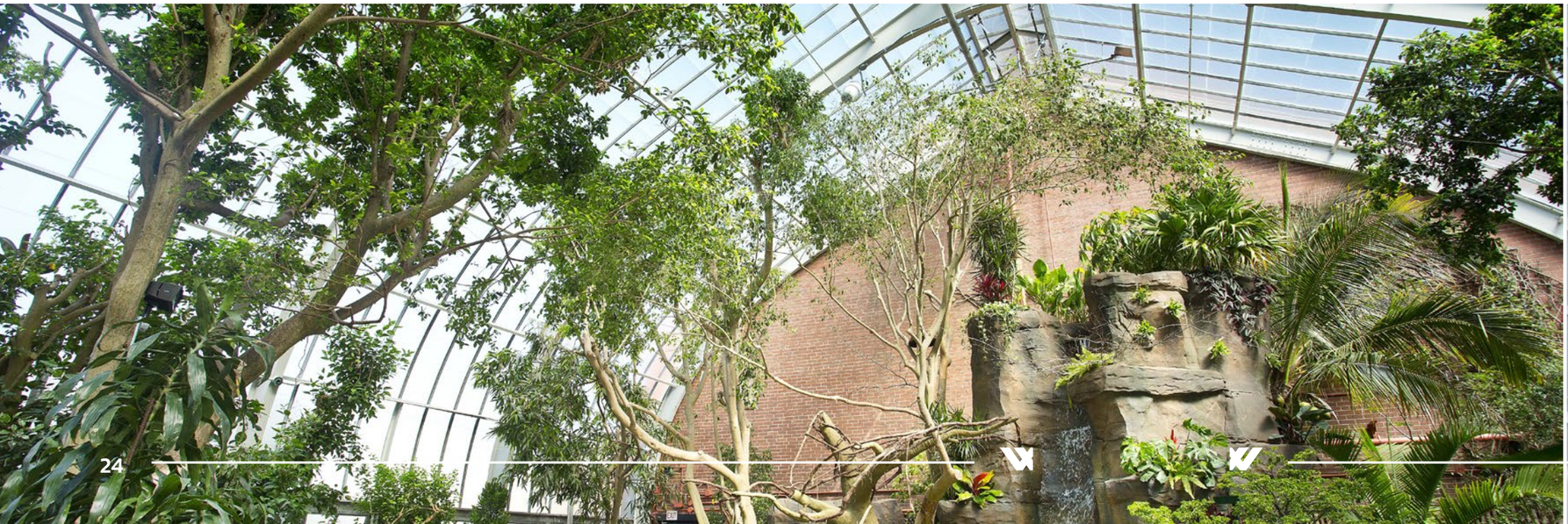
The Tropical Rainforest is a densely forested habitat full of birds, set into forested surroundings which are also full of birds. Handled improperly, this building could have been a hotbed for bird strikes. The Aviary's staff was acutely aware of the risk, which is why they chose bird-friendly acid-etched 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
- **Threat factor:** 25
- **VLT:** 92%

projects

- **Glass:** 6mm Starphire Ultra-Clear™ glass with Velour on surface 1, laminated to 2 other glass substrates
- **Threat factor:** 25

Aquarium of the Pacific, Long Beach, CA

University of Minnesota

Bee and pollinator research laboratory

St Paul, MN

The University of Minnesota's state of the art Bee and Pollinator Research Lab facilitates important bee research projects and enhances the faculty's internationally recognized teaching program. While research is going on inside, the building's glazing works to conserve energy, manage daylighting, and protect local bird populations.

- **architectural firm:** Alliiance | see the project
- **glass:** AviProtek® E 6mm clear glass with pattern 215 on surface 1 and Solarban® 70 on surface 2

- **threat factor:** 25
- **VLT:** 64%
- **SHGC:** 0.27

University of Saskatchewan

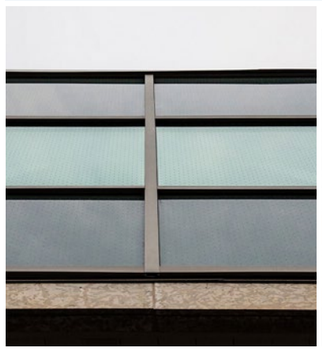
Collaborative Science Research Building

Saskatoon, SK

This research facility complements the campus' Gothic style with traditional stone work, but its outlook is entirely modern. The curtain walls and walkways use bird friendly AviProtek® glass with Solarban® coating, helping this building to achieve Two Green Globes certification for sustainable design and energy efficiency.

- **architectural firm:** Flad | see the project
- **glass:** AviProtek® E 6mm clear glass with pattern 217 on surface 1 and Solarban® 70 on surface 2
- **spandrel:** pattern 217 on surface 1

- **threat factor:** 15
- **VLT:** 64%
- **SHGC:** 0.27



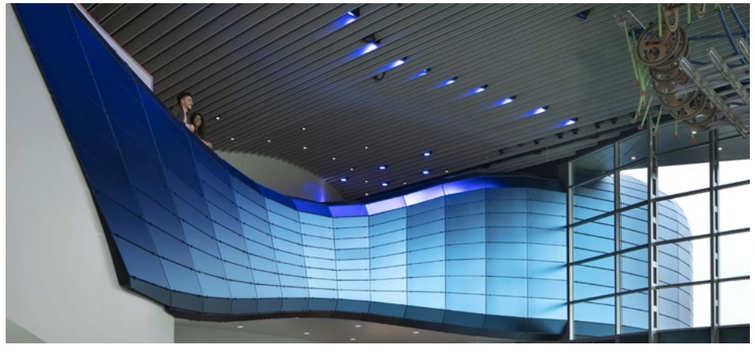
Aquarium of the Pacific

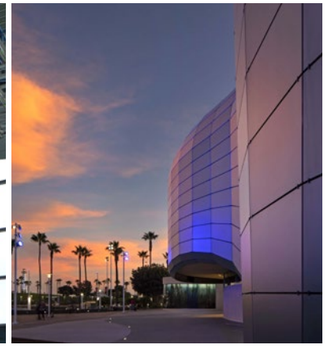
Pacific Visions Expansion

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
- **threat factor:** 25





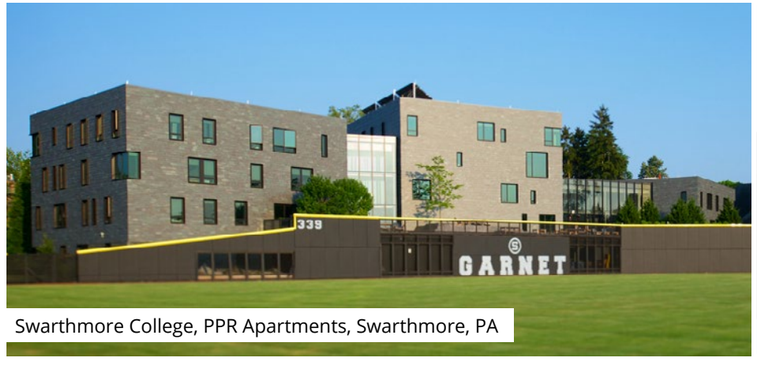
beyond local law 15

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

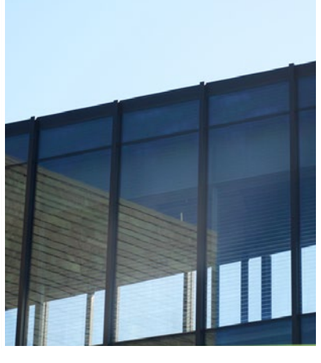
Click through to find all the project details on our site.

National Aviary Garden Room, Pittsburgh, PA

Cedar River Municipal Watershed, Seattle, WA



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. In response, the industry has adopted best practices to promote human wellbeing both during and after the construction process.

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.

More and more building owners, architects, city planners and legislative bodies are insisting on safety, sustainability and transparency in the built environment. HPD® and EPD are vital pieces in this puzzle.

Humber College, Toronto, ON

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® **Pacific Coast** 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

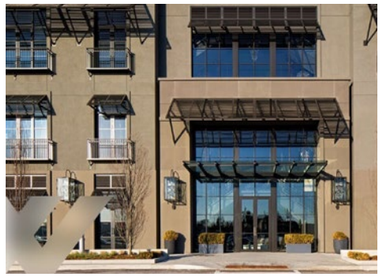
Walker offers three accredited courses, including one titled “Bird-Friendly Glazing Challenges and Solutions” to architects, designers and specifiers. Book your training session to discover creative, yet eminently practical ways that you can use bird-friendly and acid-etched glass products.

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

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