WALKER TEXTURES®

Acid-etched Glass for **Exterior Applications**

A Unique Way to Move Light!

University of Pennsylvania – Philadelphia, PA – 6 mm Starphire® custom pattern on position 1

Because acid-etching is not a coating, its resistance properties to exterior conditions are essentially equivalent to unetched glass.

Walker Textures™ AviProtek

Bird Friendly Glass

According to ABC's standard, a bird-friendly building should have at least 90% of exposed façade material from ground level to 40 feet that has been demonstrated in controlled experiments to deter 70% or more of bird collisions translating in a threat factor of 30 or less.

Many different studies conducted by experts have shown that most birds will not fly into surfaces that have two inches or less of untreated horizontal space or four inches or less of untreated vertical space. This criteria is commonly referred to as the **"2x4" rule**.

The experts also agree that uninterrupted patterns such as lines on the **number 1 surface** are the most effective in preventing bird collisions.

Bird Friendly Project - Cap Tourmente National Willdlife Area, St-Joachim, QC
AviProtek patterns 213 and 214 on position 1

Threat Factors

Patterns: 29.8 on position 1 (70.2% of times birds will avoid collision)

Full Surface: 5 on position 1 (95% of times birds will avoid collision)
25 on position 2 (75% of times birds will avoid collision)

Combining Different Glass Types

Acid-etched glass can be combined with many different types of glass technologies to create unique effects. Here are some examples:

- In insulated glass units acid-etched glass can be used in any of the 4 positions with a low-e coating on position 2 or 3, depending on the design and performance requirements.
- Creating a depth effect in the glass and removing glare at the same time can be achieved by combining acid-etched on position 1 with paint on the #2 or #4 surface.
- The acid-etched mirror effect can be achieved when etching reflective glass. This will provide muted reflection and give that depth effect.
- Acid-etched glass can be used in a laminate assembly for railing applications to obtain privacy and light flow.

Wellesley College – Wellesley, MA – 6mm clear glass Satin on position 1
with black paint on position 4

Increased Daylight Diffusion, Less Energy Consumption

Walker Textures™ **Opaque** and **Velour** finishes are excellent light diffusers. They provide as much as 79% diffuse transmittance and as much as 90% wide angle scattering commonly referred to as Haze.

As a result, acid etched glass in exterior glazing units scatters natural light over a much larger area of the interior space thereby reducing the need for artificial light and decreasing energy consumption.

The benefits are immense because countless studies prove that a well daylit environment results in enhanced human mood, behavior and performance while providing energy benefits.

Walker Glass Montreal, QC - 12 mm Starphire® glass Satin 2 faces on position 1 and 2

Light Diffusion Data

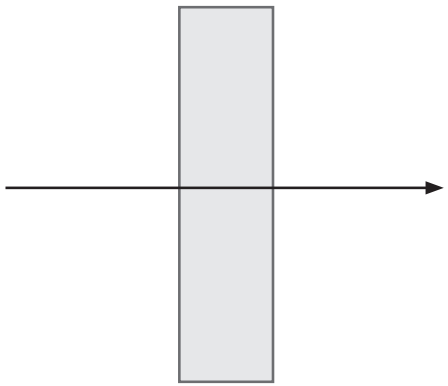
The following data was obtained from tests performed in accordance with ASTM D1003-13, "Standard Test Method for Haze and Luminous Transmittance of Transparent Plastics". This test method measures total luminous transmittance, diffuse transmittance and haze of selected ***Walker Textures™*** acid etched glass finishes. These are key metrics to evaluate the ability of the glass to diffuse light into a space.

ASTM D1003-13

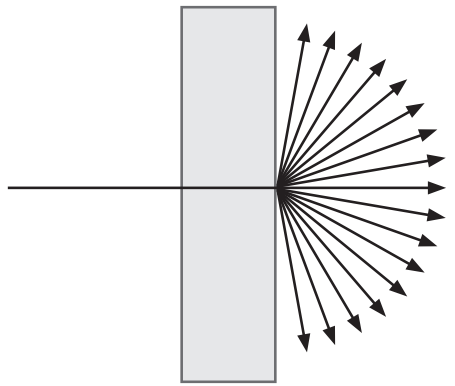
Acid-etched finish	Total Luminous Transmittance	Diffuse Transmittance	Haze
Opaque	82.50%	75.09%	90.73%
Velour	88.44%	79.00%	89.30%

All glass test specimens were 6mm clear.

Direct Light



Diffuse Transmittance & Haze



Applications

- Sealed units
- Exterior doors
- Balustrades
- Railings
- Spandrel
- Canopies
- Skylights
- Transportation shelters
- Atriums
- Bird friendly façades

and more…

INRS - Laval, QC - 6mm Starphire® glass Satin on position 1 with low-e on position 3

Benefits

- Cleaning & maintenance similar to unetched glass
- No significant impact on solar performance
- Can be exposed to weather conditions on surface 1
- Closed-pore surface that does not easily trap dirt & particles
- Reduces glare significantly
- Adds a measure of privacy
- Unique design
- Depth in the glass
- Brilliance in the surface
- No impact on visible light transmittance
- Harmonized spandrel and vision areas
- Enhanced rendering of color on glass
- Excellent to diffuse light - See data on "Daylight Diffusion"

Acid-etched Glass Properties

To support its use in exterior applications in general and on surface #1 in particular, we have conducted several **tests** to assess **resistance to wear, scratching, staining, and strength** of the acid-etched glass surface. Refer to the chart below for the properties of our four acid-etched glass finishes, indicating equal or better performance compared to unetched glass.

Test/Standard		Opaque	Velour	Satin	Satinlite	Float	Unit of Measure	Interpretation
Resistance to Wear	ASTM-C501	213	210	198	214.86	183.29	Abrasive Wear Index (Ix)	Higher number = better
Resistance to Staining	ASTM-C1378	A	A	A	A	A	Classification	Higher letter = better
Scratch Hardness	MOHs	5	5	6	7	5.5	Out of possible 10	Higher number = better

Test/Standard	6mm Satin Tempered		6mm Unetched Tempered	
Modulous of Rupture ASTM-C158	Etched Surface in Tension	Unetched Surface in Tension		Interpretation
Max load (pounds)	357	351	338	Higher number = better
Flexural Strength	1.07	1.05	1	Higher number = better
Modulous of Rupture (psi)	28720	28370	26720	Higher number = better

Performance Data

Acid-etched glass has no significant impact on solar performance when combined with energy efficient glass in an insulated unit.

In order to help with your calculations, please find below the performance data for all four finishes of 6mm (1/4") glass in clear and Starphire®.

Barnard College - New York, NY - 6 mm Starphire® glass Velour on position 1 with terracotta ceramic paint on position 2

Monolithic Unit Performance[1]				Visible Light[2]			Total Solar Energy[2]			UV[2]					
Surface Finish	# Etched Sides	Glass Substrate	Thickness mm (in)	Transmittance	Reflectance 1	Reflectance 2	Transmittance	Reflectance 1	Reflectance 2	Transmittance	Reflectance 1	Reflectance 2	SC[3]	SHGC[4]	LSG[5]
Opaque	1	Clear	6mm (1/4")	91%	7%	9%	80%	7%	8%	66%	6%	8%	0.96	0.84	1.08
Velour	1	Clear	6mm (1/4")	91%	8%	8%	82%	7%	7%	67%	7%	7%	0.98	0.85	1.07
Satin	1	Clear	6mm (1/4")	89%	8%	8%	79%	7%	7%	64%	7%	7%	0.96	0.83	1.07
Satinlite	1	Clear	6mm (1/4")	88%	8%	8%	80%	7%	8%	64%	6%	5%	0.96	0.84	1.05
Opaque	1	Starphire®	6mm (1/4")	93%	6%	8%	90%	6%	8%	90%	6%	8%	1.04	0.90	1.02
Velour	1	Starphire®	6mm (1/4")	92%	8%	8%	89%	7%	7%	88%	8%	8%	1.04	0.90	1.02
Satin	1	Starphire®	6mm (1/4")	90%	8%	8%	88%	8%	8%	86%	8%	8%	1.03	0.89	1.01
Satinlite	1	Starphire®	6mm (1/4")	90%	8%	8%	89%	8%	8%	87%	6%	5%	1.03	0.90	1.01

Notes

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

3- Shading coefficient is the ratio of the total amount of solar energy that passes through a glass relative to 3mm (1/8") thick clear glass under the same design conditions. It includes both solar energy transmitted directly plus any absorbed solar energy re-radiated and converted. Lower shading coefficient values indicate better performance in reducing summer heat gain. Shading coefficient at outdoor air temperature of 32°C (89°F), outdoor air velocity of 3.4m/s (7.5mph), indoor air temperature of 24°C (75°F), indoor air velocity of 0m/s (0mph) and solar intensity of 783w/m^2 (248BTU/h/f^2).

4- Solar Heat Gain Coefficient (SHGC) represents the solar heat gain through the glass relative to the incident solar radiation. It is equal to 86% of the shading coefficient.

5- Light to Solar Gain (LSG) ratio is the ratio of visible light transmittance to solar heat gain coefficient.

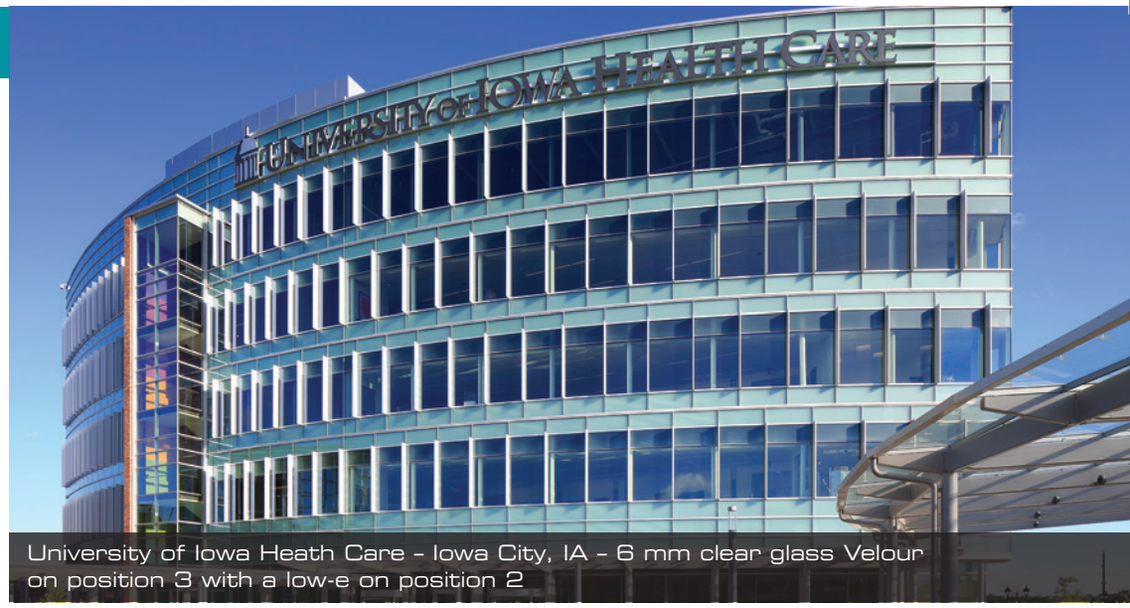
6- Values are for indication purposes only and are subject to variation according to conditions of measurement, manufacture and/or application.

7- For ***Walker Textures™ Nuance*** product line, values indicated above may change depending on the pattern type.

LEED

Green design not only makes a positive impact on public health and the environment, it can also reduce operating costs and enhance building spaces and surroundings. Walker Glass Co. Ltd. can help users of our products, and more specifically building owners get LEED points.

- Daylight contribution under the Indoor Environmental Quality category
- Innovation in Design category
- USGBC - Pilot Credit 55: Bird Collision Deterrence
  - See the AviProtek section



University of Iowa Heath Care – Iowa City, IA – 6 mm clear glass Velour on position 3 with a low-e on position 2

Sampling

- There are an unlimited number of potential combinations when using acid-etched glass in exterior applications (low-e, ceramic frit, digital printing and more).
- The best way to obtain samples for what you are looking for is to communicate with your local architectural representative who will help you throughout the design development process.
- Walker will provide standard size samples ranging from 4" x 4" to 24" x 36". If required, full size mock-ups can be made available.
- We can also provide Insulated Glass Unit samples.

Specifications

3 part specifications, comprising several critical elements, are available for ***Walker Textures™*** products.

- **Gloss range -** To ensure quality and consistency of the finish.
- **Glass Properties -** To set requirements on resistance to wear, scratch and stain.
- **Glass Performance -** To calculate the performance of the double glazed unit.
- **Cleaning -** To include post installation cleaning and maintenance instructions.

To download ***Walker Textures™*** 3 part specifications please go to:
www.walkerglass.com/products/specifications

Limited Warranty on Surface Degradation

Walker warrants, for a period of 10 years, that the etched surface will not degrade, provided that the surface is not subjected to any conditions that would otherwise lead to premature degradation of unetched float glass.

For the complete terms and conditions of the ***Walker Textures™*** warranty, please contact our architectural experts.

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