

**Opaque Beauty: Specifying Ceramic Frit
Alternative Coatings for Spandrel Glass**




Provider: InfoSpec Inc.
Course: WCD10A
GBCI Course ID: 920014832
Credit 1 AIA HSW CE Hour &
1 GBCI Hour for LEED Professionals

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Course Format: This is a live, instructor-led webinar course.
Course Credit: 1 AIA Health Safety & Welfare (HSW) CE Hour

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Course Description

The spandrel portion of a building offers the design team many options when it comes to aesthetics, function, and green building opportunities. Attendees will learn about applications for spandrel glass, various styles of spandrel glass, and environmental aspects and factors for successful specifications.

Learning Objectives

At the conclusion of this presentation you should understand:

1. Review spandrel glass and its applications including green building projects
2. Discuss the environmental durability of applied silicone opacifiers to spandrel glass
3. Explain how opacifiers can contribute to LEED v4 credits
4. List factors when specifying silicone opacifiers on spandrel glass

What Is Spandrel Glass?

What Is Spandrel Glass?

- Glass is rendered near opaque
- Used in non-vision areas
- Interior surface is NOT suitable as a finished wall
- Must be cavity backed

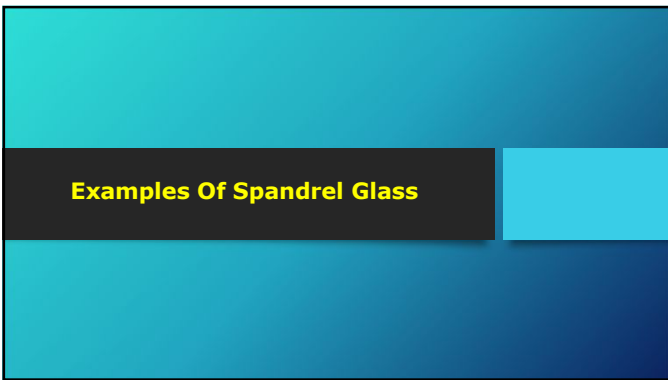
Uses Of Spandrel Glass

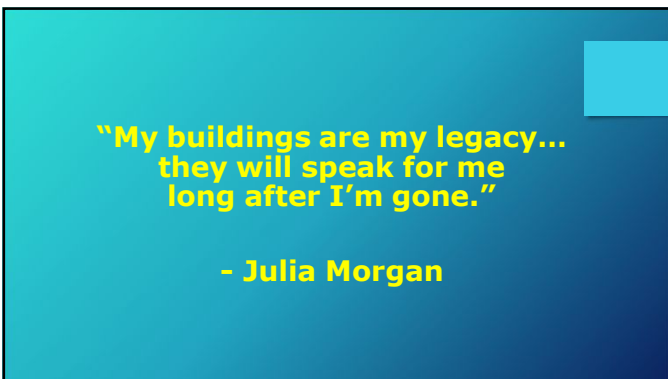
- Conceal Structural and Mechanical Elements
- Banding, Harmonizing and Matching
- Material Mimicking
- Decorative
- Retro-Fit

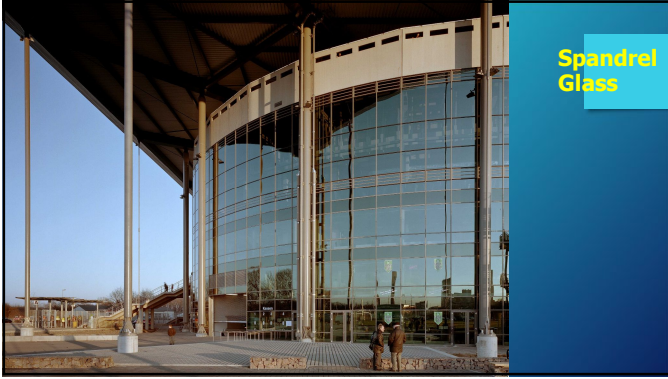
Spandrel Glass Above and Below Vision Glass



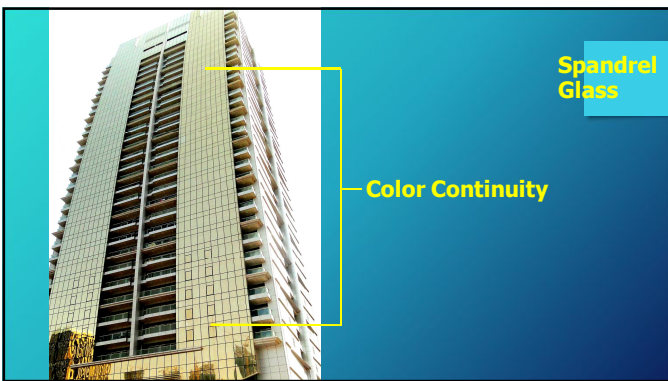


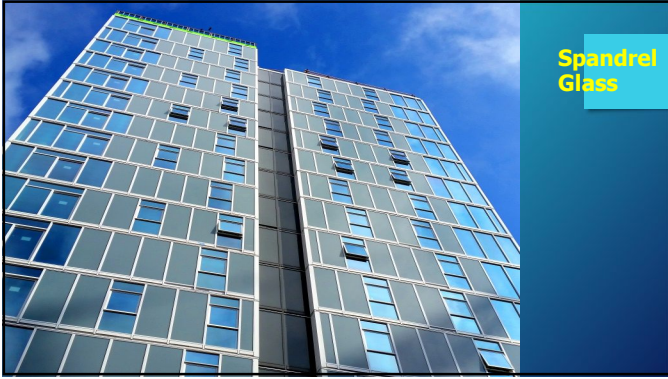






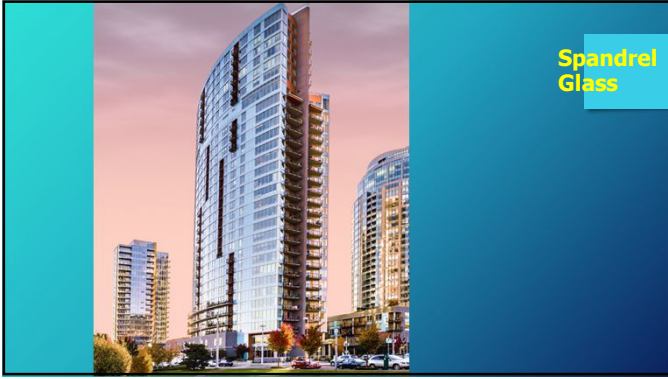


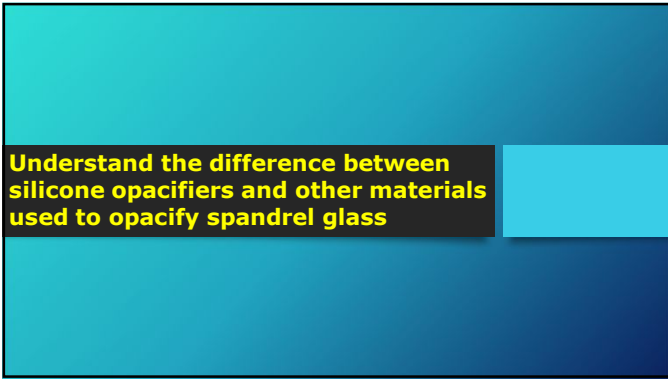














Opacifying Materials for Spandrel Glass

Trends: SPANDREL

Making Glass Opaque: Frit, Silicone Still Spandrel Products of Choice

US Glass Magazine
May 2016

Glass is the primary building product for accommodating views inside and out. It is also capable of blocking those views—with a little help from an opacifier. An opacifier is very cold to very hot in a single day, [and] humidity can as well." While the frit and silicone coatings serve similar purposes, they are applied by different processes. With frit, re-

uct used on a particular project typically depends on what the customer requests. In larger projects, one or the other is usually already specified. "If they don't specify a lot of it comes

Ceramic Enamel

- Inorganic color dispersions
- Inorganic ceramic blend – solvent or water based
- Applied before tempering glass
- Fused to glass
- Contains medium to high VOCs and heavy metal components

Silicone

- Inorganic color dispersions
- Inorganic – water based
- Applied after tempering glass "Can be applied to annealed glass
- Cures to an elastomeric film with a strong bond
- Ambient or low temperature cure
- Contains near-zero VOCs and no heavy metal components

Primary Methods for Applying Opacifiers

Ceramic Enamel

- Screen Print
- Roll Coat

Silicone

- Spray
 - Automatic or Manual
- Roll Coat



Spray Booth -Manual

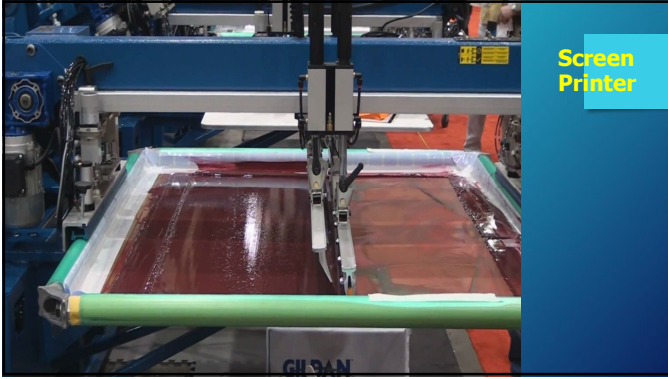


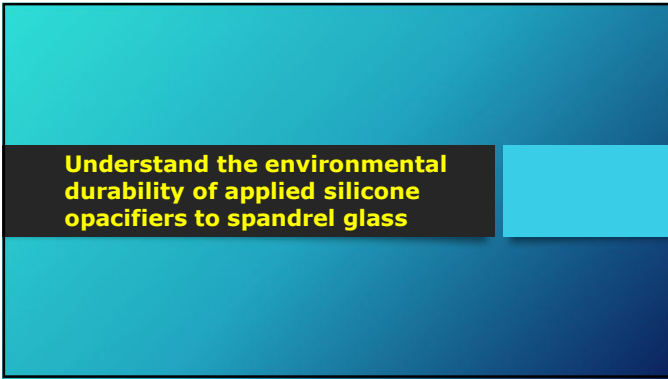
Automatic Spray Machine

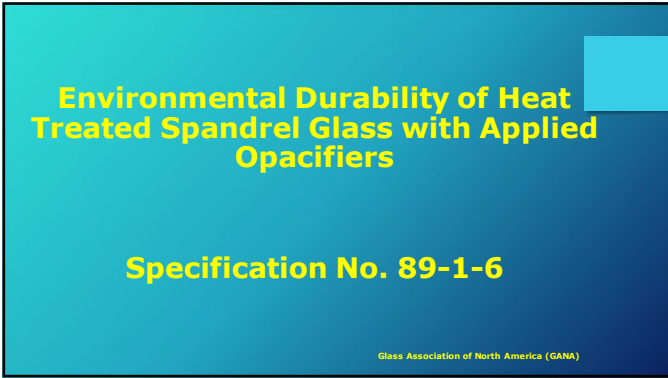
Two-Coat Metallic



Roll Coater

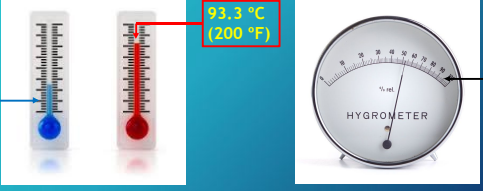






High Temperature – Low Humidity
High Temperature – High Humidity
Cyclical Temperature and Humidity

Tests

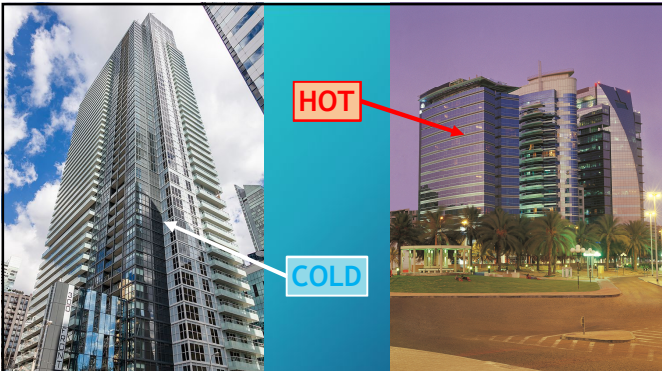


The image shows two thermometers and a hygrometer. The left thermometer has a blue liquid column at -28.9 °C (-20 °F). The right thermometer has a red liquid column at 93.3 °C (200 °F). The hygrometer shows a needle pointing to 95% R.H.

-28.9 °C (-20 °F)

93.3 °C (200 °F)

95% R.H.

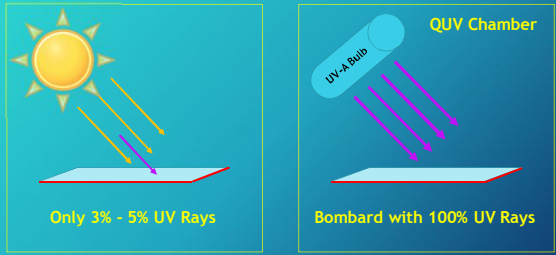


The image is split into two parts. The left part shows a tall skyscraper with a white arrow pointing to it and a blue box labeled "COLD". The right part shows a modern building at night with a red arrow pointing to it and a red box labeled "HOT".

HOT

COLD

Ultraviolet Radiation Test



The image contains two diagrams. The left diagram shows a sun with rays hitting a surface, labeled "Only 3% - 5% UV Rays". The right diagram shows a "UV-A Bulb" inside a "QUV Chamber" emitting rays onto a surface, labeled "Bombard with 100% UV Rays".

Only 3% - 5% UV Rays

Bombard with 100% UV Rays

UV-A Bulb

QUV Chamber

After Testing

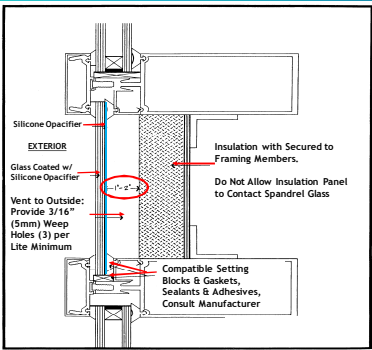
NO

Coating Must Show:

- Bubbles
- Peeling
- Crazing
- Cracking
- Tunneling
- Shrinkage
- Staining
- Discoloration
- Delamination

Understand the considerations when specifying silicone opacifiers on spandrel glass

Field Installation Detail – Monolithic Glass Spandrel with Silicone Opacifier



EXTERIOR

Silicone Opacifier

Glass Coated w/ Silicone Opacifier

Vent to Outside: Provide 3/16" (5mm) Weep Holes (3) per Lite Minimum

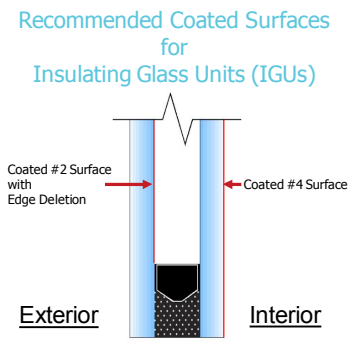
Insulation with Secured to Framing Members.

Do Not Allow Insulation Panel to Contact Spandrel Glass

Compatible Setting Blocks & Gaskets, Sealants & Adhesives, Consult Manufacturer

Insulating Glass Unit Detail – Coated Surfaces with Silicone Opacifier

Recommended Coated Surfaces for Insulating Glass Units (IGUs)



Coated #2 Surface with Edge Deletion

Coated #4 Surface

Exterior Interior

This diagram illustrates a cross-section of an Insulating Glass Unit (IGU) with two glass panes. The exterior pane has a coating on its second surface, and the interior pane has a coating on its fourth surface. A silicone opacifier is applied to the bottom edge of the IGU. The diagram is labeled with 'Exterior' on the left and 'Interior' on the right.

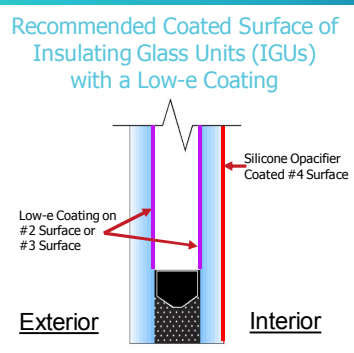


Surface #2 Edge-Deletion

This photograph shows a close-up of the edge of a glass pane. A yellow highlight is drawn along the edge, indicating a specific area of concern related to surface #2 edge deletion.

Insulating Glass Unit Detail with Low-e Coating

Recommended Coated Surface of Insulating Glass Units (IGUs) with a Low-e Coating

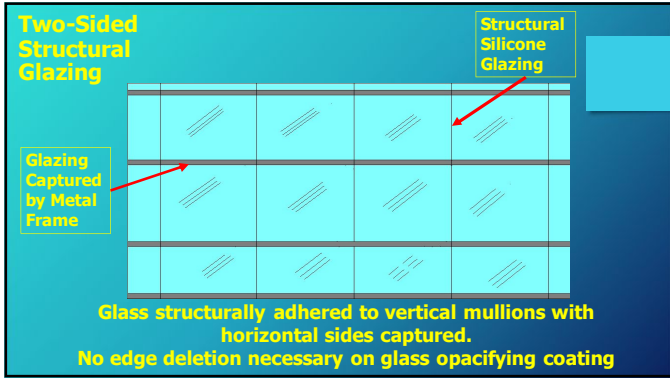


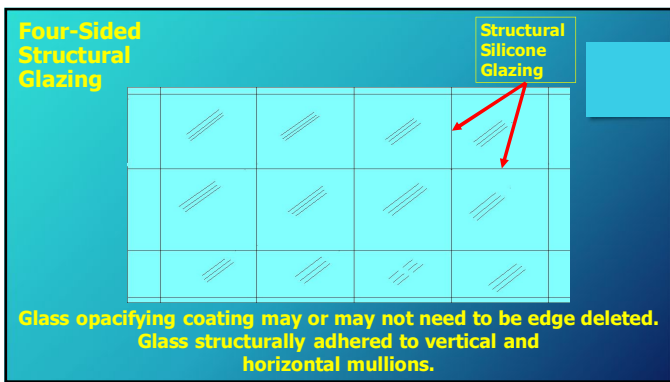
Low-e Coating on #2 Surface or #3 Surface

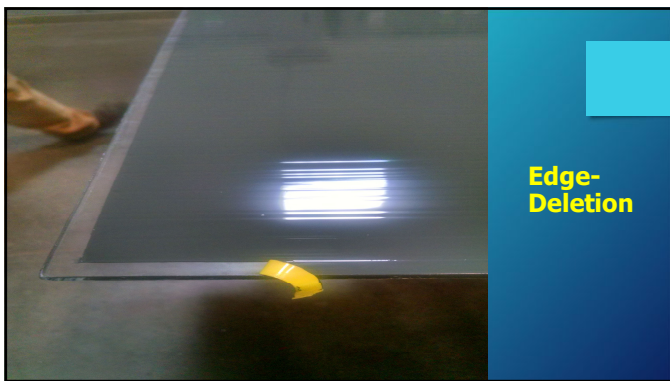
Silicone Opacifier Coated #4 Surface

Exterior Interior

This diagram shows a cross-section of an IGU with a low-e coating on either the second or third surface of the exterior pane and a silicone opacifier coating on the fourth surface of the interior pane. The diagram is labeled with 'Exterior' on the left and 'Interior' on the right.







For Use in Non-Vision and Cavity-Backed Areas Only



When Cavity Backed – Spandrel Glass Achieves Its Desired Appearance



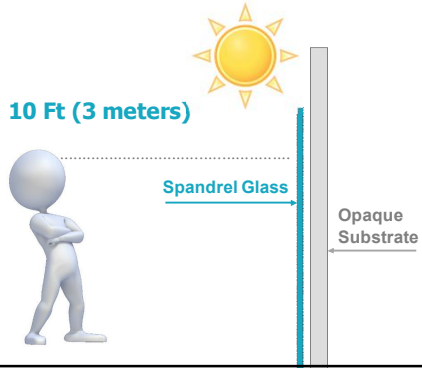
Applied Film Thickness

- 8 mils (.2mm) wet applied for opacity on all applications
- 12 mils (.4mm) wet applied suggested for light colors
- 13 mils (.5mm) wet applied for "Fallout Protection" per GANA Specification No. 89-1-6 Section D.3

Spandrel Glass Inspection

All spandrel coatings are subject to the same viewing criteria:

ASTM C 1048, Section 10.10



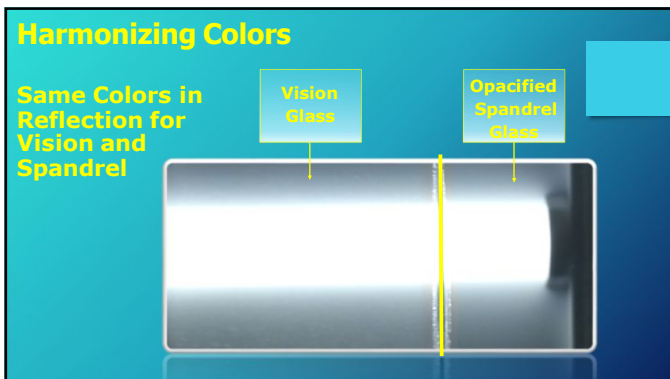
Understand the advantages of using silicone opacifiers for spandrel glass

Advantages of Silicone Spandrel Coatings

- Limitless Colors
- Predictable Final Color
- Color Tolerance of .2dE
- Fallout Protection
- Glass Strengthening
- Eco-Friendly







Harmonizing Colors

Color Resemblance to Vision Glass

Vision Glass

Opacified Spandrel Glass

Predictable Final Color

What Controllable Conditions Affect the Final Color of Your Spandrel?

TEMPERATURE

GLASS TYPES

MFG'S COATING COLOR TOLERANCE

Color Tolerance

Just Noticeable Difference (JND) at 1 - 2 dE

Reference Color

B

A

0.4dE

0.2dE

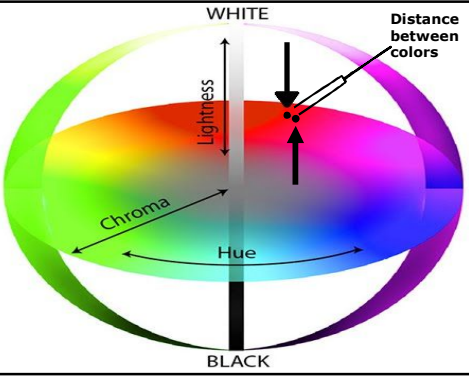
1dE

1dE

2dE

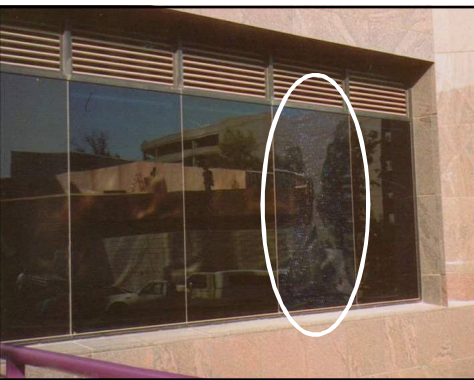
Color Tolerance of .2 ΔE

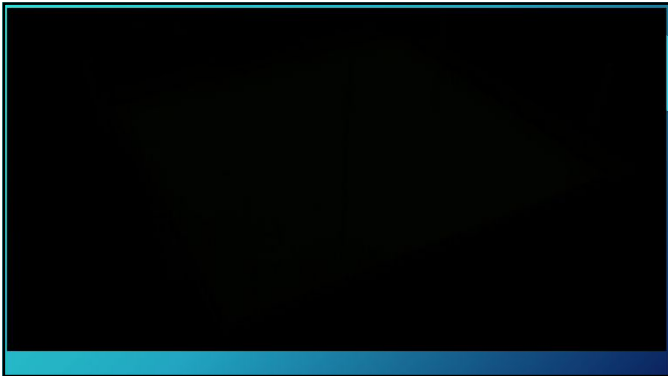
- Industry's closest color match
- Imperceptible difference
- Lessen Unpredictability



Fallout Protection

- Temporary glass retention
- Fitted spandrels need an applied film
- NOT Security or Safety Glazing





Fallout Protection

- Silicone Opacification Selected
- Value Engineering Employed
- Aesthetic Benefit



Glass Strengthening

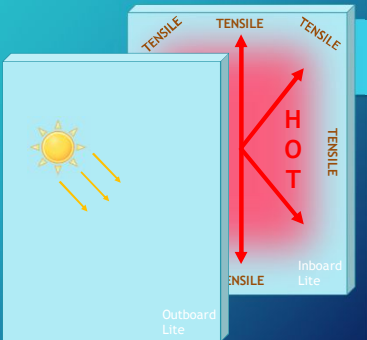
- 4-Point Bending
- Ball Drop

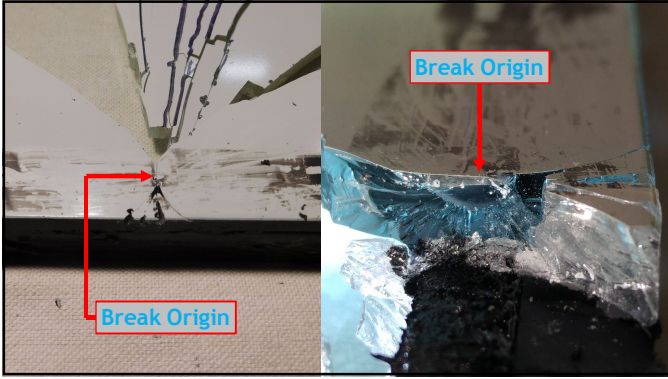
HOW STRONG IS YOUR SPANDREL GLASS?




Hot Center + Cooler Edges

Tensile Stresses






Eco-Friendly



Near-Zero VOCs → Zero VOCs When Cured

No Heavy Metals



Recognize up to seven (7) credits toward a certified Green Building Rating (LEED™ 2009)

Potential LEED Credits using a Silicone Opacifier v.2009

- LEED Category: Materials & Resources
- Construction Waste Management (Credit 2.0)
 - 3 Points
- LEED Category: Materials & Resources
- Manufactured Regionally (Credit 5.0)
 - 3 Points
- LEED Category: Indoor Environmental Quality
- Low Emitting Materials: Paints and Coatings (Credit 4.2)
 - 1 Point

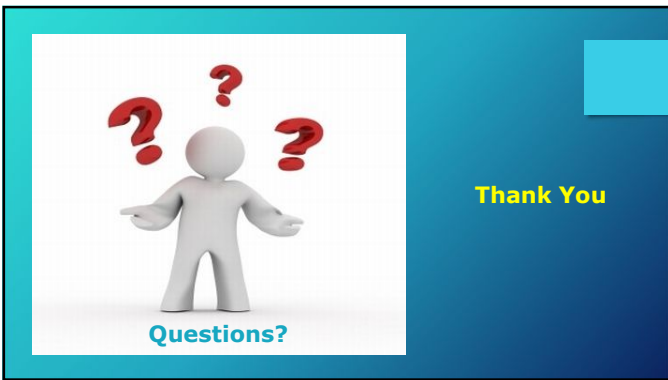


**Recognize up to five (5) credits
toward a certified
Green Building Rating (LEED™ v4)**

Potential LEED Credits using a Silicone Opacifier v.4

- LEED Category: MR Materials & Resources
- PBT Source Reduction – Lead, Cadmium, Copper
- Applies to Healthcare
 - 2 Points
- LEED Category: EQ Indoor Environmental Quality
- Low Emitting Materials
 - 1-3 Points





Opaque Beauty: Specifying Ceramic Frit
Alternative Coatings for Spandrel Glass

ICD
HIGH PERFORMANCE COATINGS
GLASS & CURTAIN WALLS

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