



## 19: TOP 3 GLAZING DESIGN CONSIDERATIONS

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# DEVIL'S DETAIL

## INTRODUCTION

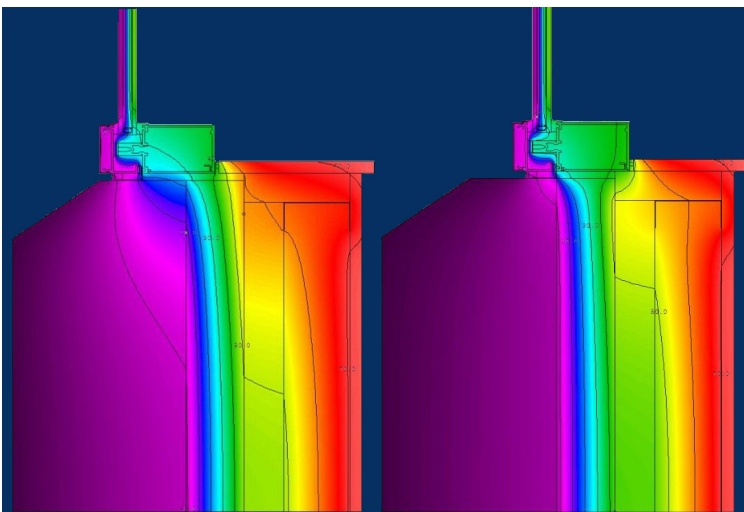
To continuously educate our glazing contractor members and the wider design and construction community, AGI sought the input of a façade consultant to advise on the top considerations for building envelope glazing conditions.

Dana Landis, forensic engineer and façade consultant with Wiss Janney Elstner Associates, Inc. (WJE) weighed in with her recommendations. WJE is a global leader in the industry, founded over 60 years ago. The company offers a multidisciplinary team of engineers, architects, and materials scientists who combine laboratory and in-field testing capabilities to solve construction challenges. WJE professionals have experience with virtually every construction material, structural system, and architectural component. WJE provides consulting ranging from testing and assessment to materials science to design-assist and peer review. As a senior associate with experience in a wide variety of project types, Dana focuses on façade assessments, building enclosure commissioning and peer review, and hygrothermal analysis of façade systems. She also develops repair and rehabilitation documents, conducts water leakage investigations, and provides construction observation services.

## WHY A FAÇADE CONSULTANT?

In a continuously evolving construction climate, new players seem to come on the field each day. Why engage another voice with respect to glazing considerations? A façade consultant serves as a safeguard, mediator, and facilitator between the voices of design and construction to ensure successful projects. As a neutral third-party, the façade consultant may be able to reconcile a problematic detail, shed light on construction alternatives, or support decision-making.

According to AGI member contractor Joe Clabbers of National Glass & Metal Company, Inc., when he sees problematic details, even at the bid stage, he hopes there's a building envelope consultant involved. "I really do welcome it," Clabbers explains. "As a glazing contractor, I don't want to be the bad guy, and I want to be involved in the design process. The façade consultant can take different perspectives and components and bring them together, so the architect doesn't feel they are being overridden."



*At right: The position of the fenestration system can greatly affect the thermal performance of the system.*



## 1. CHOOSING THE CORRECT SYSTEM

### CONSIDERATIONS

Interfaces, alignment, and thermal performance are the critical factors impacting system selection. When choosing a glazing system, consider the following:

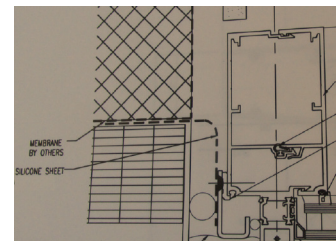
- In opaque wall cladding systems (e.g. terra cotta, metal, panelized brick), the position of the water-resistive barrier (WRB) plane is constantly shifted. The team should consider not only how the WRB interfaces with the glazing system from a thermal, air, and watertight perspective but also from an aesthetic and functional point of view, as sight lines and shadows will be impacted.
- Consider that in prefabricated wall systems, the WRB is often concealed several inches behind the face of the cladding and/or plane of the fenestration system.
- Interfaces are also important in how air, water, and thermal control layers line up with glazing systems. The glazing system needs to align with the thermal control plane while attempting to avoid significant thermal bridges.
- For humidified buildings, a glazing system with better condensation resistance may be required.

### RECOMMENDATIONS

Landis recommends face-to-face page-turn sessions among the design team and contractors early in a project. These sessions enable discussion from different perspectives, fleshing out of details, identifying and correcting areas of concern, and everyone building an understanding of the factors driving decision-making. When conducted early in a project, the discussion can inform selection of the correct system that meets owner's performance requirements as well as budget and schedule constraints.

"Typically, these sessions are most effective after first submissions in order to review comments on shop drawings," Landis explains. "But they may also happen during a pre-installation meeting and are at the crux of design-assist project methodology. It is important that tradespeople are aware of critical project-specific interface details with other trades."

*Right: Detail of silicone transition membrane providing continuity between unitized curtain wall and water-resistive barrier.*



*Undulations inherent to precast concrete plank construction create joints that vary in width at fenestration perimeters.*



*Example of condensation on interior of fenestration system due to improper system selection and/or detailing.*



*Conflict between unitized curtain wall and prefabricated wall panel: no space was left to install a proper sealant joint between systems.*

## 2. TOLERANCES AND JOINT SIZES

### CONSIDERATIONS

Architects often desire minimal joint sizes for aesthetic factors. Narrow joint sizes are typically in conflict with schedule-driven release of materials. There's not adequate time to field measure or adjust the framing to different sizes in order to match conditions. Consider the following related to construction tolerances and joint sizes:

- Are there incompatible tolerances where two or more materials come together?
- Do the variations in masonry standard tolerances impact glazing standard tolerances and consider differential thermal expansion?
- How will loading conditions impact construction tolerances or joint sizes? Prefabricated wall panels, for example, may be dead-loaded at different floors.
- Have cambers in precast floor planks been considered? Slab undulations may result.

### RECOMMENDATIONS

Landis recommends beginning with standards and typical industry tolerances. Then consider movement capabilities. For example, most silicones can accommodate movement of up to one half of the joint width. High and low tolerances can have a big effect – one-half-inch high to one-quarter-inch low = three-quarter-inches overall. Consider materials in relation to one another. She recommends going no lower than three-eighths of an inch in joint sizing. Be especially cautious since openings are often defined by their smallest constraint. Layering of materials at openings, including, but not limited to, WRB, flashing, panel returns, and end dams, should all be considered.



## 3. PERIMETER SEALANT CONTINUITY

### CONSIDERATIONS

According to the article Glazing published by the Whole Building Design Guide, the waterproofing performance of a glazing system depends on drainage details, internal framing seals, external (glass-to-frame) seals, and frame perimeter seals and flashings. Perimeter sealant continuity and uniformity are critical considerations, along with the following:

- The location of the primary seal may vary depending on the fenestration type selected.
- Prefabricated wall systems often don't offer access to the WRB for sealant continuity vs. traditional wall panels. Consider the connection to the glazing system.
- Are there any incompatibilities between the sealant and the water-resistive barrier or waterproofing materials?
- Glazing seals between glass and framing may require periodic replacement to ensure performance. Has future replacement been factored into the design solution?

### RECOMMENDATIONS

Landis recommends the following when designing for perimeter sealant continuity:

- Insulated glass unit durability is dependent upon continuity and uniformity of dual seals. Both should be specified.
- Glazing gaskets cannot exclude all water, so be sure to provide internal drainage.
- Two lines of sealant are recommended at the perimeter of window walls and storefront assemblies: an exterior weather seal and a primary air seal.
- For curtain walls, a minimum of two lines of perimeter sealant should be installed from the exterior (an exterior weather seal and a primary seal), while a third could be added to the interior (interior air seal).
- The increased use of rain-screen systems means contractors should be aware of the wet/dry line location. In most rain-screen systems, it is typically concealed behind cladding.

*Left: Example of silicone transition membrane installed to provide continuity between the fenestration and the Air Vapor Barrier.*

## FOR MORE INFORMATION

GLAZING by Nik Vigener, PE and Mark A. Brown (May 2016)

<https://www.wbdg.org/guides-specifications/building-envelope-design-guide/fenestration-systems/glazing>



**Wiss, Janney, Elstner Associates, Inc.**

## WJE RESOURCES

Visit WJE online for a collection of technical articles:

<https://www.wje.com/knowledge/articles>

5 Keys to Understanding the Value of Building Enclosure Commissioning (BECx) by Ross J. Smith, WJE

Retrofitting with High-Performance, Aluminum-Framed Window Systems by Jean J. Wu, WJE

## ADD YOUR VOICE

Responsible contracting requires problem-solving. AGI members and their peers need to be at the forefront of proactive problem identification. Tools such as the Devil's Details help make this possible by offering education, recommendations, and opportunities to share your experiences.

AGI's next Devil's Detail: Top 3 Installation Considerations is currently in the works. Don't miss out on YOUR opportunity to participate.

With new products and designs evolving quickly, even the brightest may struggle to keep up. AGI helps bridge this learning gap with programs and materials to support continuing education:

- Architectural Glass Boot Camps: learn hands-on glazing techniques
- Devil's Details: view the entire series online at <https://www.theagi.org>

## About the Devil's Details

The AGI educational series illustrates and describes common glazing challenges as a means to communicate best practices for the design and construction industry, not as a sole source for design guidance. AGI recommends design professionals consult with an AGI contractor regarding specific project challenges. AGI contractor profiles may be accessed at [www.theagi.org](http://www.theagi.org). To share a devilish detail of your own, contact [info@theagi.org](mailto:info@theagi.org).