



## 20: TOP 3 GLAZING INSTALLATION 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 facade consultant to advise on the top considerations for building envelope glazing conditions.

Dana Landis, PE, forensic engineer and facade consultant with Wiss Janney Elstner Associates, Inc. (WJE) weighed in with recommendations on this piece as she did for [Devil's Detail 19: Top 3 Glazing Design Considerations](#). WJE offers a multidisciplinary team of engineers, architects, and materials scientists who combine laboratory and in-field testing capabilities to solve construction challenges. As a neutral third-party, a facade or building envelope consultant such as Landis serves as a safeguard, mediator, and facilitator between the voices of design and construction to ensure successful projects.

For this piece, an AGI committee of member glazing contractor representatives shared their insights about proper installation techniques and typical field concerns. Instructors with the Finishing Trades Institute also contributed their input about how the apprentice education process helps to foster communication and train glaziers in the proper installation methods recommended by manufacturers.

*Installation considerations range from improperly prepared openings to joint plug and end dam concerns to issues of continuity. Below left: Opening planar offset between curtain wall frame and exterior sheathing. A silicone transition membrane was used to achieve a seal between the WRB and curtain wall. Below right: Improperly sized opening (note WRB in contact with frame at bottom corner).*



## 1. IMPROPERLY PREPARED OPENINGS

*"We're ready for you..."*

Glaziers are typically not responsible for preparing the openings into which their glazing systems and windows must be installed. Improperly prepared openings are a major concern. According to AGI member contractor Joe Clabbers of National Glass & Metal Company, Inc., it is a "struggle every day on most jobs" where one or more openings has something incorrect.

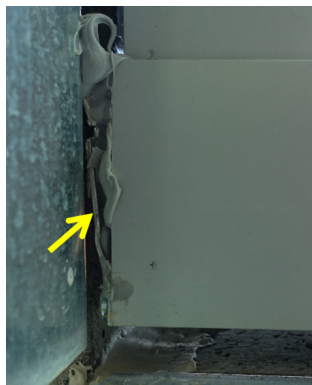
Typically, glaziers are responsible for inspecting each opening and notifying the general contractor of concerns. If a glazier begins installation of his system without notifying the GC of any concerns, he accepts the conditions as adequate. Thus, glaziers effectively attain the role of quality control for another contractor's work, making the glazier the "bad guy" if he points out a problem. Improperly prepared openings could lead to future water infiltration, reduced glazing system performance, or other issues.

### CONSIDERATIONS

The following conditions can compromise an opening:

- Opening out of plumb, level, or square.
- Improperly sized opening; even a fraction of an inch can make a big difference.
- Improperly installed or missing Weather-Resistive Barrier (WRB).
- Improperly constructed or located knee walls.
- Incorrect or inadequate substrate for fasteners.
- Anchors disrupting the WRB or air seals.
- Wood blocking not properly anchored to supporting structure (fasteners need to withstand loads imposed on blocking from the glazing system).
- A window will perform better when placed in alignment with adjacent WRB and thermal control layers (insulation).

*Below left: Flashing membrane not continuous at rough opening, which could allow water to bypass the perimeter joint sealant for the curtain wall. Below middle: Displaced end dam; note daylight showing through. Below Right: Improperly sealed joint plug. Right: Void in sealant between the end dam and the sill receptor; note visible daylight between the end dam and sill receptor at yellow arrow.*



The following conditions contribute to compromised openings:

- Unclear details. It is important that drawings indicate opening conditions and all the components that need to be in place including material thicknesses that may affect the available opening dimensions.
- Incorrect representation of glazing products in architectural drawings. It's important for designers and glaziers to ensure the basis of design systems are shown accurately and modified, if needed, for any proposed substitutions.
- Intentionally vague architectural drawings that leave interface details to glaziers. While this may seem like a safeguard to a designer, it means the glazier must perform design-build methodology on a project that's not necessarily meant to be design-build, impacting time and potentially budget.

### RECOMMENDATIONS

- Allow glaziers to participate in pre-installation meetings. Early engagement with the glazing contractor will enable a practical dialogue during detail development that would help meet a project's budget, schedule, and performance requirements.
- In some projects, architects are writing building enclosure coordination meeting(s) into the contract. When a pre-installation meeting occurs between all parties responsible for design and construction of the building enclosure, they can together identify critical issues to address and methods for resolution in advance.



## 2. JOINT PLUGS & END DAMS

Curtain wall joint plugs/zone dams, window sill end dams, and storefront sill receptor end dams are critical components of a glazing assembly. Be sure to consult the manufacturer's manuals and installation guidelines to understand the type of joint plug or end dam your fenestration system requires.

Manufacturers typically describe the proper way to install joint plugs to create strong seals; for example, by buttering three sides with sealant before plugging. But that messy process leads some to plug and then butter around the edge. Since the plug is hidden by a gasket (often not immediately installed) and pressure plate, it is hard to tell if it is not sealed all the way around. Frame joinery, fastener heads, and gasket corners all must be sealed at critical interfaces to avoid potential issues with water leakage.

### CONSIDERATIONS

- Ensure proper installation of joint plugs with adequate sealant on four sides.
- Plastic joint plugs are less forgiving than foam, and plastic end dams are not as rigid as their metal counterparts; ensure sealant is installed per manufacturer guidelines.
- Pay special attention to screw splines and raceways, which can create difficult-to-seal conditions.
- Once frames are set, it is very difficult to repair end dams; sill dam and splice testing (AAMA 511) prior to setting the window frames can mitigate the need for future repair.
- Thermally improved and thermally broken systems have other considerations, such as sealant compatibility with the thermoplastic thermal break material.

### RECOMMENDATIONS

- Landis recommends performing at least a percentage of sill dam testing. Flood testing takes 15-20 minutes and provides quick assurance of correct installation with no water infiltration. The test is done by taping the front edge of the sill, plugging the weep holes, and filling with water. Although many contractors perform the test regardless, mandating it in the specs would be a smart, fast preventive measure.
- Apprentices are trained to go by the manufacturer's requirements. Designer familiarity with manufacturer requirements can ensure all expectations are aligned.
- Most glaziers in the field – even aces – never directly communicate with a facade consultant. Those conversations are typically reserved for project managers or foremen. Consultants and designers on site should not be afraid to ask questions to understand how a glazier is doing his/her job.

## 3. IMPORTANCE OF CONTINUITY

Continuity is a critical concern for building envelope performance. When desiring tight building envelopes without significant breaches or thermal bridging, architects should understand that continuity of construction materials plays a major role. For example, thermally improved cladding attachments (e.g. Cascadia Clips) may not provide the overall anticipated performance if the support for the fenestration system (e.g. steel tube, plate, or angle) creates a thermal bridge. A high performing WRB won't provide the anticipated air and moisture protection if there are gaps in its installation.

### CONSIDERATIONS

- Lack of WRB or discontinuity (e.g., open seams, damage, and other breaches).
- Pieces of WRB partially tied in. This is a condition often seen in a project that's behind schedule, where a small amount of WRB has been installed in order to allow construction to proceed in one spot while work commences elsewhere. These pieces create extra seams in the field of the membrane and may create reverse-shingled laps, which can hold water and creates a higher risk of failure.
- Damage to foil facing on spandrel insulation. The delicate foil facing is easy to damage but imperative to fix. Holes to the insulation could lead to moisture infiltration or mold.
- Architects should understand how the design of substrate, perimeter, and components beyond the window can or may affect the window. All of the building envelope components should be considered and designed as a system.

*Below: Sill dam testing in progress.*



## CONCLUSION

As outlined in [Devil's Detail 19: Top 3 Design Considerations](#), a team approach, communication, and collaboration during the design process can mitigate most issues.

### Communication:

- Engage glaziers early and often.
- Utilize glaziers' knowledge of structural properties and system capabilities to meet budget, aesthetic, and performance goals.
- Conduct pre-installation meetings with all building envelope teammates.
- In a team approach, all parties should look to communicate in a holistic manner. Glaziers can be valuable to GCs by recognizing issues – even when they are not the party responsible for resolution. The holistic approach means everyone recognizes the elements that affect their piece of work.

### Collaboration:

- Specify a process for reporting deficient work. A clause in the specs requiring GCs and subs to report deficient work within 24 hours would change the game in the field. This documented liability shift would give architects a better picture of field issues and limit each party's responsibility for downstream liability.
- Have protocols in place for resolving field issues. AGI member glaziers typically rely on field personnel (e.g. foreman or site superintendent) to report issues internally. Then in-office project management staff document the issue and address it with the GC. This "good cop, bad cop" approach keeps the field relationships strong while ensuring the entire chain of command understands the concern.

### AGI Member Glazing Contractor Efforts:

- Training and workforce ability to overcome issues. These topics are addressed during the apprenticeship process. AGI is training its workforce to recognize certain conditions. According to Glazier Instructor Matt Fox, apprentices learn they need to document issues immediately.

- Member contractors should have internal protocols to plan their work. Crews visually inspect the openings prior to starting their work in order to identify issues in advance.
- NACC and AGMT glazier certifications add another layer of sophistication to certified contractors' approach to proactive communication, documentation, and issue resolution.
- AGI preaches quality management systems regardless of certification and highlights the need for protocols. Every AGI member glazier is aware and has an advanced level of training to identify and overcome issues.

## 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.

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>

Special thanks to [WJE](#) for continued support of AGI initiatives:



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

## 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).