GLASS & METAL ALLIANCE

02: THE IMPORTANCE OF DETAILING

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# DEVIL'S DETAIL

## IMPORTANCE OF DETAILING

The first Devil's Detail introduced the differences between curtain wall and window wall systems, and how to properly address inherent issues of weather tightness. Transitions in the building envelope are critical for the effective control of heat, air, and moisture within a structure. In Devil's Detail 2, the focus is on design and detailing, both of which are of critical importance to any curtain wall, window wall, or storefront glass because of the component nature of the systems. Attention to detail ensures considerations for structural integrity, movement, and weather tightness.

Stiffness rather than strength typically governs the structural design of aluminum curtain wall and storefront. The anchorage to the building structure must be designed to address both the negative and positive pressure imposed by wind. Substantial movement due to thermal effects and other causes, such as expansion and contraction of the adjacent building envelope assembly, can also occur at the joints. Provision must be made to accommodate these movements without compromising the integrity of the glazing system. Anticipating and accommodating movement while still maintaining continuity in the air, water, vapor, and thermal control layers means joint design becomes a key factor in wall performance and a critical aspect of design and detailing.

Integrating a weather resistive barrier (sometimes abbreviated WRB) into the system of glazing components can successfully maintain the aforementioned control layers. Care should be taken to require that specifications adequately describe the performance requirements for both the glazing system and the air and vapor barrier (sometimes abbreviated AVB) integration.

3.3 INSTALLATION

A. Transition Membrane
1. Apply primer as recommended by manufacturer.
2. Align, position, and adhere transition membrane as required by manufacturer, and press firmly into place. Ensure minimum 2 inch overlap at all end and side laps.
3. Tie-in to window frames, hollow metal door frames, spandrel panels, roofing system and at interface of dissimilar materials as indicated in Drawings, providing minimum 1 inch adhesion on metal and 2 inch on membranes.
4. Promptly adhere laps and membrane.
5. Ensure preparatory work is complete prior to applying air barrier.

B. Fluid Applied Air Barrier:
1. Do not apply to wet surfaces.
2. Apply within manufacturer's recommended temperature limits.

**3. Tie-in to window frames, hollow metal door frames, spandrel panels, roofing system and at interface of dissimilar materials as indicated in Drawings, providing minimum 1 inch adhesion on metal and 2 inch on membranes.**

*Figure 1*

D. Align window plumb and level, free of warp or twist. Maintain dimensional tolerances and alignment with adjacent work.
E. Install sill and sill end angles.
F. Provide thermal isolation where components penetrate or disrupt building insulation. Pack fibrous insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.
G. Coordinate attachment and seal of perimeter air barrier and vapor retarder materials.

3.03 TOLERANCES

A. Maximum Variation from Level of Plumb: 1/16 inches very 3 ft (1.6 mm/m) non-cumulative or 1/8 inches per 10 ft (3 mm/3 m), whichever is less.

3.04 FIELD QUALITY CONTROL

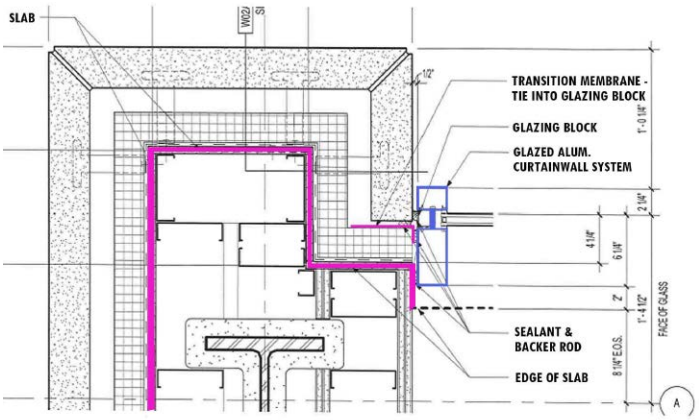
A. Test installed windows for compliance with performance requirements for water penetration, in accordance with ASTM E1105 using uniform pressure and the same pressure difference as specified for laboratory testing.

**G. Coordinate attachment and seal of perimeter air barrier and vapor retarder materials.**

*Figure 2*

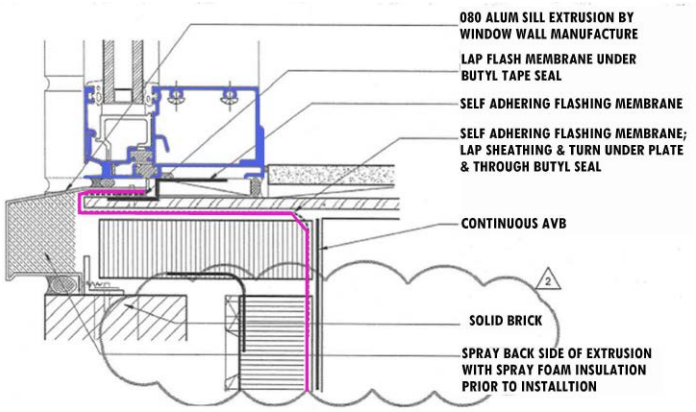
*Above: Example specification language for air and vapor barrier and glazing system integration*

**EXAMPLE 1**




*Example 1: Section detail at jamb showing inappropriate location of the primary seal of the glazing system.*

**EXAMPLE 2**




*Example 2: Sill detail showing inappropriate location of the primary seal of the glazing system.*

# SUPPORTING THE SPECS

Construction details should support the specification language by clearly depicting how to integrate the air and vapor barrier into the glazing system. The details should fully resolve any challenges that may result from the aesthetic requirements or complexity of the wall assembly.

The location of the glazing system within the plane of the wall can present significant obstacles for satisfying the structural anchorage. As the plane of the glazing system moves toward the exterior face of the cladding, the ability to integrate the air and vapor barrier can become impractical or impossible. Similarly, the designer should verify the location of the primary sealant joint to confirm that it can be properly installed at the perimeter and be continuous from head to jamb to sill. Additionally, as the glazing system moves outward within the plane of the wall, construction field tolerances can affect constructability.

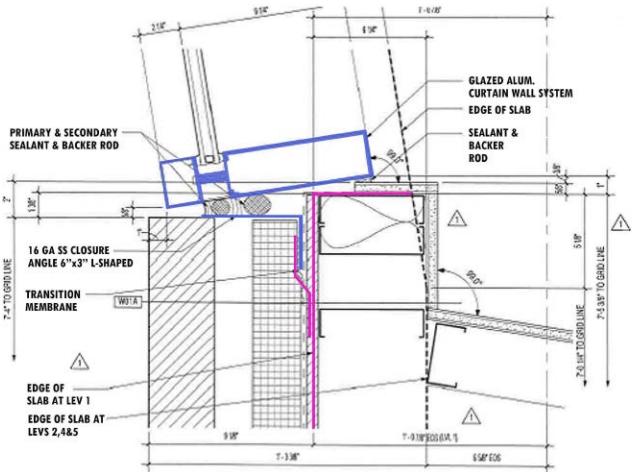
Often within the same set of system details for a particular project, the design may require a specific geometry that results in the need to augment the system with an accessory component. In the first example, a stainless steel closure plate was used to resolve the location of the primary seal shown in Example 1A. As the geometry changed within the same glazing system, an accessory component was required to satisfy the installation of a proper primary sealant joint.

Ultimately as construction installation and sequencing were examined by the glazing contractor, the proposed detail was augmented further to accommodate the transition from the sill to the jamb (illustrated in Example 1B). Ultimately, the installed weather resistive barrier wrapped the framing of the rough opening at the sill, head, and jamb (shown in Example 1C). The stainless steel closure was then installed and sealed to the weather resistive barrier to allow for proper integration of the sill to jamb intersection (shown in Example 1D).

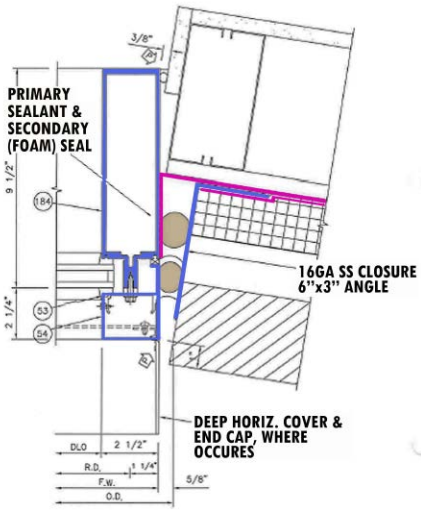
In the second example, the sill design detail included the addition of self-adhered membrane flashing to extend the weather resistive barrier into the rough opening of the glazing system. The detail required that the flashing membrane overlap a butyl seal to maintain continuity between the weather resistive barrier and the glazing system at the sill. The jamb design detail, however, required that the air and vapor barrier extend into the glazing pocket of the glazing system in Example 2A.

The glazing contractor reviewed the detail and proposed to use the sill extrusion accessory to connect the air and vapor barrier to the glazing system (Example 2B). Two sealant joints were installed to achieve a dependable and durable connection, particularly as the system transitioned from the sill to the jamb (Example 2C) and the jamb to the head (Example 2D).

## EXAMPLE 1



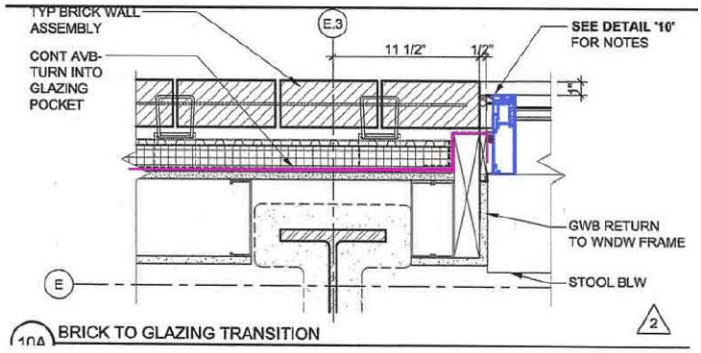

*Example 1A: Shop drawing section detail at splayed jamb*



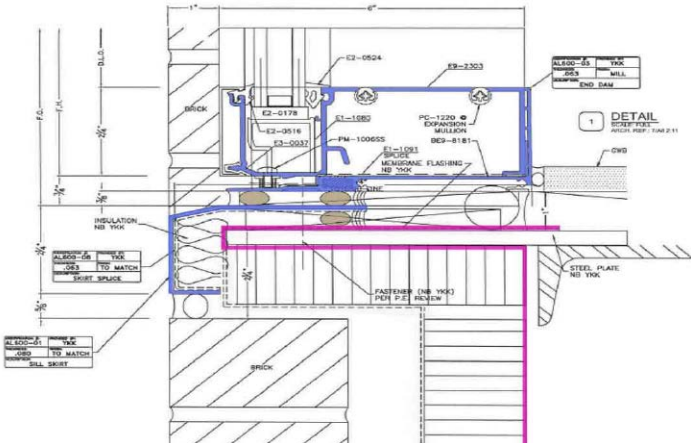

*Example 1B: Revised shop drawing section detail at splayed jamb*

*Example 1C: Jamb to sill intersection*

## EXAMPLE 2




*Example 2A: Jamb detail at brick to glazing transition*




*Example 2B: Shop drawing sill detail*

*Example 2C: Jamb to sill intersection with adhered membrane*

# DESIGN ASSISTANCE

Regardless of the size of the project being considered – a small one-story building or a monumental high-rise structure – it is beneficial for the designer to seek the advice of one or more sources before finalizing the design.

A manufacturer or glazing contractor can provide advice during the early stages of design that can aid an architect's design development process. Advance communication and cooperation can prevent many of the difficulties that might arise.

Manufacturers can typically provide recommendations and suggestions that are most advantageous to consider while at the conceptual design phase. This advice and the respective value vary with the size, importance, and complexity of the project. Even with standard products, there are often certain details requiring clarification, or practical limitations to be explained, especially when modifications to the design are contemplated. If the wall will be custom designed, the importance of competent, early advice is much greater, regardless of the project size.

Glazing contractors provide the benefit of their extensive field experience and knowledge of production processes and installation methods. They are able to analyze a general concept, recognize potential problems, and offer suggestions that might aid the designer. By facilitating production, glaziers' early involvement usually results in cost savings as well.

Failure to seek advice can often lead to difficulties later. It's not unusual to discover, for example, after a job is out for bid, that parts of the wall, as detailed, are very difficult or practically impossible to produce, or that they are structurally inadequate, that the tolerances allowed in the design are unrealistic, or that there isn't enough clearance provided to permit easy installation. The addition of the closure plate in the first example is one such occurrence.

# ADDITIONAL CONSIDERATIONS

As with any other type of exterior building wall, thermal insulating value may be an important consideration in many geographic locations. The necessity for low sound transmission may also be a requirement affecting wall design. Such needs are satisfied in aluminum curtain walls by applying in their designs the accepted principles of heat flow and acoustics.

The performance of any metal curtain wall depends in large measure on how well its designer understands not only the principles of natural laws but also how these affect the detailing of the wall. The Devil's Details series will address these subjects in depth in future editions.

*Example 1D: Jamb to sill intersection with stainless steel closure*

*Example 2D: Jamb to head intersection*

## About the Devil's Details

**The Glass & Metal Alliance (GMA) 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. GMA recommends design professionals consult with a GMA contractor regarding specific project challenges. Contractor profiles may be accessed at glassandmetalalliance.com. To share a devilish detail of your own, contact info@glassandmetalalliance.org.**