ECO CLADDING
Engineered. Compliant. Optimized.

A WHITE PAPER

AIR BARRIER BREACH IN RAINSCREEN SUB-FRAMING SYSTEMS

Introduction: Installation Inefficiencies and Sealant Detailing

With all the code changes and requirements for Continuous Insulation (c.i.) on Light Gauge Metal Framing (LGMF), Z girts have proven to be challenging to seal for water/airtightness. Although commonly utilized due largely to budgetary constraints, the structural and load challenges, thermal inefficiencies, unnecessary breaches to the weather barrier, and fundamental installation inefficiencies of the Z girt approach are increasingly dating and disproving this approach for long-term rainscreen assembly performance. ECO Cladding provides the next generation solution!

As rainscreen cladding took hold in the US design market, Z girts have proven to be challenging to seal for water/airtightness and are very inefficient thermally. Additionally, there is increasing evidence and data to illustrate that the Z girt approach, although deemed simple and cost-effective, actually is fraught with hidden costs and performance risks that can be easily negated by selecting an engineered, bracket-based wall assembly approach.

This white paper seeks to provide a foundation for how the wall bracket sub-framing assembly is leveling the playing field in terms of cost and installation efficiency. Topics discussed will include the following:

1. **FEWER PENETRATIONS IN THE AIR BARRIER**
2. **COMPLICATIONS WITH SEALING THE BREACH OF THE AIR BARRIER**
3. **INSTALLATION INEFFICIENCIES & SEALANT DETAILING**
4. **STRUCTURAL & LOAD CHALLENGES**

Fewer Penetrations to the Air Barrier

Brackets allow for fewer penetrations into the air barrier. All manufacturers of air barriers agree, fewer holes in the barrier guarantee a better performing solution for the building. A corrosion, resistant aluminum bracketed system can span greater distances between attachment points, thereby minimizing the penetrations through the insulation and membrane, while still supporting structural loads. This approach offers a more thermally efficient wall design and is compliant with continuous insulation requirements.

Complications with Sealing the Breach of the Air Barrier

Over time, the effective seal of the screw attachment or breach of the air barrier is a major concern. Wind load and dead load applied to the horizontal Z's, will cause the girt to rotate and pull away at the top, allowing water to migrate and collect between the leg of the Z and the air barrier, effectively allowing water direct access to the blind seal at the perimeter anchor. This is particularly problematic with permeable air barriers that are very common in mixed humid climates.

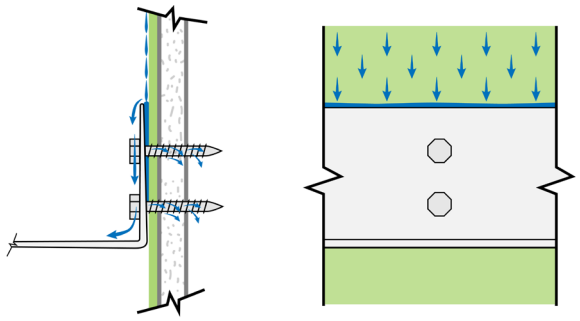


FIGURE: WATER COLLECTION OVER TIME WITH TYPICAL Z DETAIL

The need for shims with Z girts further complicates things structurally and allows unabated access to blind seal at the perimeter anchor. An upside-down shim is the perfect collector of liquid water, which often follows the screw into the wall assembly. Conclusively, self-tapping screws will not seal when they breach the air barrier behind the Z leg, again, opening up the wall for water intrusion.

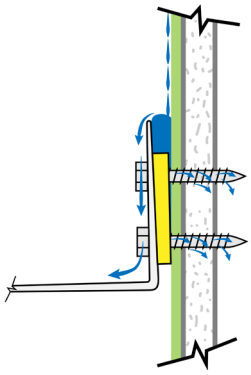
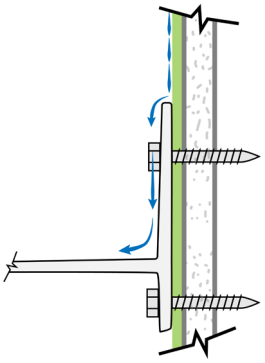


FIGURE: WATER COLLECTION WITH Z GIRT AND WALL SHIM

Conversely, by utilizing a bracket-based sub-framing system, there is no need for shimming the individual wall brackets and the dynamics of compression of each wall bracket as it is fixed to the wall substrate provides demonstrated pre-punched holes in the brackets, allows for appropriate sealant detailing at the screw attachment point (slotted holes should not be used).



Installation Inefficiencies & Sealant Detailing

In addition to the challenges presented with the penetration points of the weather barrier using the Z girt approach, there are real-life installation challenges present when using Z girts in large scale rainscreen construction. In most installation scenarios, there is considerable silicon sealant utilized to apply the Z girt to the wall – from the initial setting of the various Z girts due to the lack of pre-punched attachment points. Once the Z girt is set, additional silicon is applied at the top of the pre-formed shape and also applied at each of the individual fastener attachment points. This approach is both labor intensive and increases the opportunity for installation error and inefficiency. If the Z girt also needs to be shimmed, the ability to prevent leaks in and around the shims also becomes increasingly difficult.

PHOTO: EXCESSIVE USE OF SILICON SEALANT WHEN Z GIRT IS APPLIED TO THE WALL

PHOTO: BRACKET-BASED SYSTEMS ONLY REQUIRE 1 SMALL DAB OF SILCON AT FASTENER POINT

With a bracket-based sub-framing approach, the dynamics of compression with each wall bracket against the weather barrier and sheathing provides the simplest and most installation-friendly approach. Once each bracket is set with the self-drilling fastener, only one small dab of silicon is necessary to ensure that the penetration point is effectively watertight. Very quickly, wall brackets can be set efficiently, and fastener penetrations can be rendered watertight with very little silicon sealant needed.

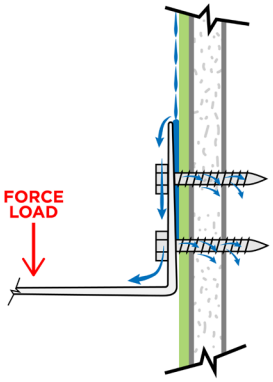


FIGURE: CHALLENGES WITH Z GIRT WEAKENING OVER TIME

Structural & Load Challenges

Exterior rainscreen system depths are rapidly growing in size from early designs of 1 inch or 2 inches to variable depths of 4 inches up 10 inches plus. As the cantilever of the cladding load increases, the Z girt becomes increasingly weaker and weaker in carrying the dead and wind loads, failing to meet the stiffness or deflection criteria of the cladding panel design criteria.

In contrast, with a bracket-based sub-framing assembly, wall brackets are pre-punched with round holes to eliminate the issue described above. When dead and wind loads are applied to the wall bracket, the presence of the down leg of the wall bracket shape ensures that regardless of the increase in the cladding load, the wall bracket remains fixed and unchanged, instead of running the risk of being deformed and in a worst-case scenario, being pulled off the wall. Thus, the need for engineered sub-framing to accommodate multiple system depths is essential.

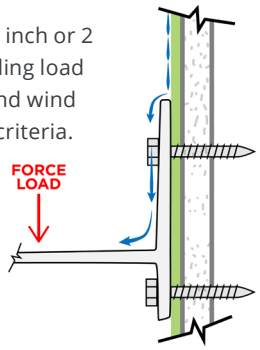
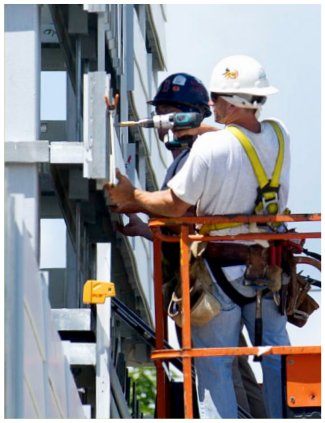


FIGURE: ADVANTAGES OF DOWN LEG OF WALL BRACKET

Bracket-based Assemblies: Balance and Performance

In summary, any sub-framing system for rainscreen cladding should meet a balance of properties to provide long-term high-performance walls:

- **Punched holes in brackets** to allow for sealant of screw penetration of the air barrier. Dipping the screw threads or buttering the hole prior to screwing will provide a very effective seal at the penetration of the membrane.
- **Internal shimming** – by punching a "thumb" or "helping hand" into the bracket you can build into the system 1 ½" of adjustability to plane out the cladding and eliminate any of the complicated, time-consuming and poorly sealed shims behind the Z girts.
- **Variable bracket legs** to accommodate any cavity depth from 2" to 11" deep systems.
- **Thermally broken and thermal modeling** provided in each design to meet the energy code requirements for opaque walls.
- **High strength to weight ratios** allowing for maximum spans or spacing of the brackets to minimize thermal bridging. Also, high corrosion and fire resistance contribute to the 50 to the 100-year design life of these assemblies. Aluminum or stainless steel are ideal metals for selection, not compromised by corrosion of holes common to galvanized metal or fire in the case of FRP plastic girts or brackets.
- **Fully-engineered assemblies** with integrated shop drawings coordinated with the cladding material specific to the project that meets all the wind load, dead load and deflection criteria of the panel and coordinated with the panel shop drawings to handle all the thermal and slab edge deflection criteria.



Next Generation Sub-framing

A holistic approach to complex code requirements and wall assemblies are the best solution to sound engineering and sound design. Before we can address a holistic design, we must understand the multitude of performance requirements in our complex, demanding assemblies today.

With over 25 years of demonstrated, real-life experience in the North American rainscreen market, the ECO Cladding wall bracket and rail assemblies effectively address all the performance problems outlined above and should be considered for all types of rainscreen cladding design assemblies.

Interested in learning more? Call us at **855-237-3370** or email **info@ecocladding.com**.

For typical details, along with access to our system specifications, visit **www.ecocladding.com**.

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