

EIFS ASSEMBLIES

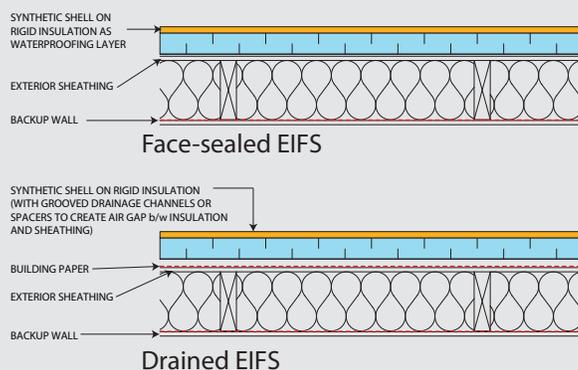
Face-Sealed vs. Drained Systems

Exterior Insulation Finish Systems (EIFS), are popular and economical cladding systems that consist of an outer shell of synthetically bonded aggregate/cement reinforced with glass mesh and applied over a base of rigid insulation. This article discusses the two types: face-sealed and drained, the moisture management and durability of each, and suggestions on where EIFS may be successfully applied.

In Alberta, rain, ice, snow, and freeze/thaw cycles are the primary sources of moisture that structures are exposed to. The amount of water actually deposited on a wall can vary dramatically in a given climate zone depending on factors such as building shape, overhangs and wind patterns. It is crucial that exterior envelope systems are designed and detailed to effectively manage moisture throughout the year.

Face-sealed EIFS utilizes a waterproof outer shell to keep exterior moisture outside of the wall assembly. A significant concern with this approach is that imperfections in design, materials, or construction can compromise the impermeability of the finish and allow moisture into the envelope.¹ Face-sealed EIFS does not have a means of directing water out of the assembly; once inside, trapped moisture can damage sensitive materials and result in health and air quality issues. Because face-sealed EIFS does not include provisions for drainage or drying from the inside of the assembly, it has largely been replaced by *drained* EIFS.

Drained EIFS is fundamentally different from face-sealed systems in that it anticipates water ingress and provides a means for it to exit the assembly before it can cause problems. Should moisture penetrate the outer shell and insulation layer, it reaches a drainage gap (grooved insulation, wrinkled building paper, spacers, etc.) that allows the water to run downward until it reaches a flashing and is directed out of the wall via weep holes. Note that the drainage gap is typically very narrow and may still allow capillary action to occur; it is not a true rainscreen. Good water management (rainscreen) and insulation located on the outside of the structure makes drained EIFS acceptable for some applications. Careful consideration must be given to where it is installed, since the finish as well as the extruded polystyrene (it is typically applied to) may be susceptible to damage.



Drained EIFS should only be applied in locations where it is less vulnerable to damage by maintenance activities or vandalism, and only used over substrates such as concrete or concrete block where moisture ingress and deterioration is less of a concern. Storage, assembly, gymnasias, and other low-humidity facilities may be acceptable building



Considerations When Using EIFS

- **Cracking** - Alberta's freeze/thaw cycles, rain/snow/ice exposure and normal building movement can contribute to cracking of the outer shell, especially at corners, substrate joints, and window and door openings.
- **Moisture Penetration** - Often occurring in tandem with cracking, moisture ingress can result in mold, rot, corrosion, staining and even ice buildup in walls.
- **Moisture Management** - Face-sealed EIFS does not have a secondary moisture barrier and is more vulnerable to moisture ingress and damage. Once water gets into the assembly, it is difficult for it to escape. Drained EIFS utilizes a backup moisture barrier, flashings, and weep holes to allow water to exit the wall assembly before it causes problems.
- **Durability** - Impact damage (e.g. balls hitting a school wall, ladders, etc.) can result in cracking or dents which can allow moisture into the wall assembly.
- **Repairs** - resealing of joints, patching of cracks and holes, and refinishing of the outer shell are costly, temporary, difficult to colour match, and can rapidly degrade the aesthetic value of a building.



typologies. EIFS application between grade and 3000mm is not recommended, due to the increased risk of damage closer to ground level. Wall panels should be compartmentalized with through-wall flashings for exterior drainage at every floor and frequent inspection and maintenance of joints, exterior finishes, and sealants should be planned for the entire system life².

A Pressure Equalized Rain Screen Insulated Structure Technique (PERSIST) assembly is the recommended approach for GoA buildings. PERSIST walls incorporate a water shedding outer layer (cladding) to prevent ingress of bulk water into the building envelope. Any moisture that does penetrate the cladding layer is directed back outside via an air cavity, flashings, and designated drainage openings (see *Design & Technology Series 01* for details). It is possible to design a building facade with a stucco finish which aesthetically resembles EIFS, and follows PERSIST methodology:

- Interior gypsum board and finish
- Structure
- Exterior sheathing
- Self-adhering air/vapour barrier membrane
- Rigid Insulation
- 25mm vertically drained air space
- Sheathing on vertical z-bars
- Building paper (moisture protection membrane)
- Traditional stucco in 3 coats on wire mesh (scratch, brown, finish coats) – finish coat may be a veneer stucco)*.

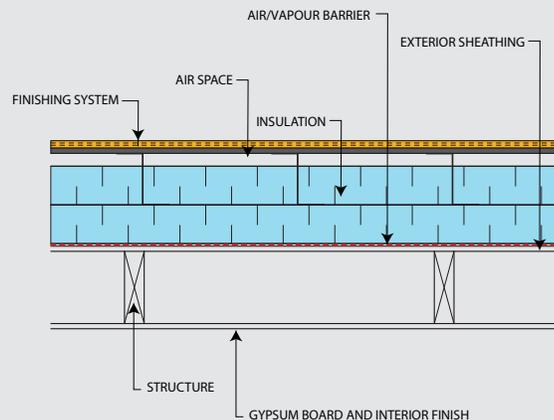
*Note that the surface of this system is still as susceptible to damage as EIFS and is therefore not recommended for use within 3000mm of grade.

Woodpeckers vs EIFS

Many species of woodpecker can be found throughout Alberta, including the Pileated (shown above) and the Northern Flicker. In the spring and summer months, these birds can be heard using their beaks to drum on trees and other surfaces as they attempt to attract mates.

One of the favourite places for woodpeckers to hammer on is EIFS. The hard shell on top of rigid foam affords the birds an excellent surface on which to play their mating call. Not only is this a nuisance to the occupants within the building, but once the woodpeckers break through the shell, the soft insulation is easy to dig through and creates a well protected nesting place³. The resulting damage can lead to expensive and yearly repairs, as well as baseball-sized openings in the envelope through which water can enter and heat can escape.

Several instances of woodpecker damage in EIFS have occurred in GoA facilities and in other buildings throughout Alberta². While the issue of woodpeckers may seem trivial, the problem is significant enough that some suppliers have begun marketing “woodpecker resistant” EIFS systems!



Important: Never use a non-permeable finish on exterior stucco, as it can prevent drying of the interior of the wall. There are many commercially-available products that provide a coloured layer for exterior stucco and also allow moisture to dry to the exterior.

Information Sourced From:

1. <http://buildingscience.com/documents/digests/bsd-146-eifs-problems-and-solutions>
2. Technical Services Branch: *Architectural Shared General Comments 2015*
3. <http://www.cbc.ca/news/canada/calgary/woodpeckers-drilling-costly-holes-in-calgary-homes-1.3080149>