Drainage Efficiency of ZIP System® Sheathing

Effective Water Management in Walls

Effective control and management of water intrusion is a top priority for all wall assemblies and can be achieved using several rain water management strategies:

- Deflection - Keeping rain water off the wall using large overhangs and a face-sealed approach, i.e. perfect barrier walls
- Drainage - Using an effective water shedding surface, i.e. water-resistive barrier)
- Drying - Moisture that cannot be drained immediately should be dried as quickly as possible)

While deflection may appear as the best moisture management solution, constructing a watertight wall can be difficult to achieve. Sealing all cracks, penetrations and joints to create an effective barrier requires highly skilled installers and must be properly maintained over time. It is important that wall assemblies be designed in such a manner to tolerate water infiltration effectively and provide the ability to dry relatively fast after periodic wetting events. Providing a secondary layer of defense behind the cladding such as a drainage plane has proven to be an effective construction practice. When an air gap is incorporated between the cladding and drainage plane, it minimizes the adverse effects of rain water infiltration into the wall assembly.

Improving Drainage Capability

A typical “drainable” wall system controls water infiltration through kinetic energy (raindrop momentum), gravity, surface tension, and capillary action. In order to achieve effective drainage within a wall assembly, the following elements should be incorporated into the design:

- Primary water shed layer (deflection)
- Secondary water-resistive barrier
- Drainage gap
- Weep holes/flashing

Figure 1 displays the primary elements of a drainable wall assembly. An effective drainage Plane is achieved using water repellent materials fully integrated with weep holes and flashing elements in a watertight manner. The assembly shown will drain water that could penetrate through the exterior cladding. The width of the drainage gap does not have to be large in order to provide effective drainage of water. Typically, only 1/16 inch (or about two millimeters), is sufficient to allow effective drainage of water.

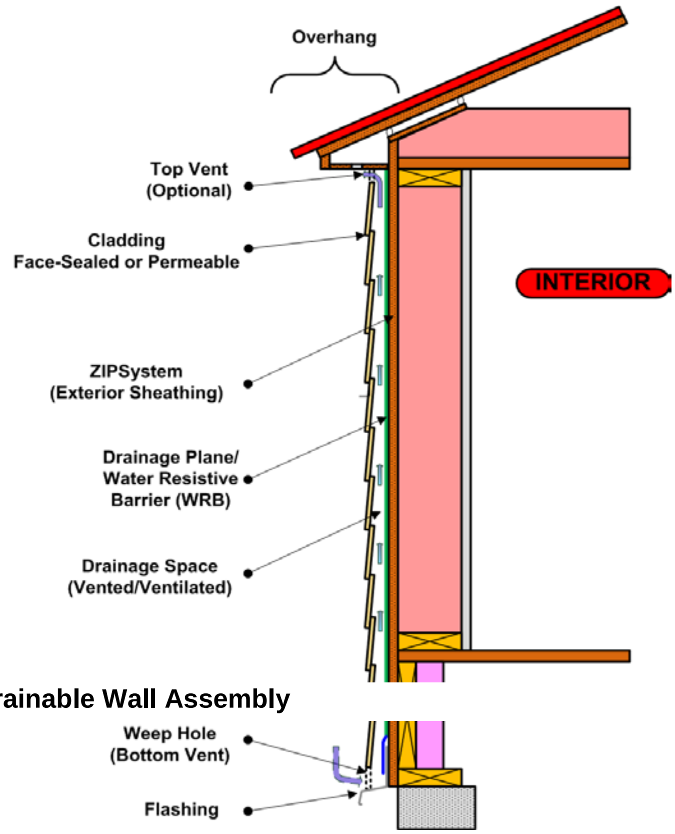

Figure 1: Drainable Wall Assembly

In addition to enhanced drainage, the drainage gap between the cladding and drainage plane serves several other purposes:

- Provides a capillary break between the cladding and other wall assembly components, reducing hydrostatic pressure.
- Functions as a buffer chamber which moderates the pressure difference and corresponding wind-driven rain across the cladding.
- Allows air movement through the cavity and promotes ventilation (convective) drying of the wall between wetting events.

How to Evaluate Drainage Efficiency of Water-Resistive Barriers (WRB)

Although enhanced drainage is widely accepted as an effective rain control strategy, not all wall assemblies and water resistive barriers (WRB) drain water at the same rate. Considering the variability in WRB and cladding materials available on the market, it would be cumbersome to evaluate the drainage performance of every possible configuration. Currently, the industry standard specifically designed to evaluate the drainage capability of wall assemblies is ASTM E2273-03 (2011): *Standard Test Method for Determining the Drainage Efficiency of Exterior Insulation and Finish Systems (EIFS) Clad Wall Assemblies*.

Figure 2 shows a simplified schematic of the ASTM E2273-03 test setup. Water is injected through a slot fault at the top of the test specimen (standard 4-ft by 8-ft wall assembly). Drainage efficiency is defined as a percentage of water that passed through the test specimen divided by the total amount of water sprayed into the slot fault. The water is sprayed for 75 minutes and the amount of collected water is measured at 15 minute intervals during spraying. The total amount of collected water is measured 60 minutes after the water spray is terminated. The 2012 International Building Code (IBC) Section 1408.4.1 and 2012 International Residential Code (IRC) Section R703.9.2 require an average minimum drainage efficiency of 90 percent when tested in accordance with ASTM E2273. Independent third party laboratory testing of ZIP System Sheathing verified 98 percent drainage efficiency. The exceptional drainage performance of ZIP System sheathing is achieved through the innovative design and arrangement of the microstructure texture on the panel surface.

While the existing test method does not evaluate WRB drainage performance with claddings other than EIFS, it provides valuable information regarding the general drainage properties of the WRB. By having rigid EPS foam firmly attached and pressed against the surface of the WRB, the potential for drainage is significantly reduced. In other words, the test setup establishes the most conservative conditions for drainage. Therefore, any other cladding with an air space between the WRB (e.g. vinyl siding, fiber cement) will provide a less restrictive path for drainage and a higher level of drainage efficiency.

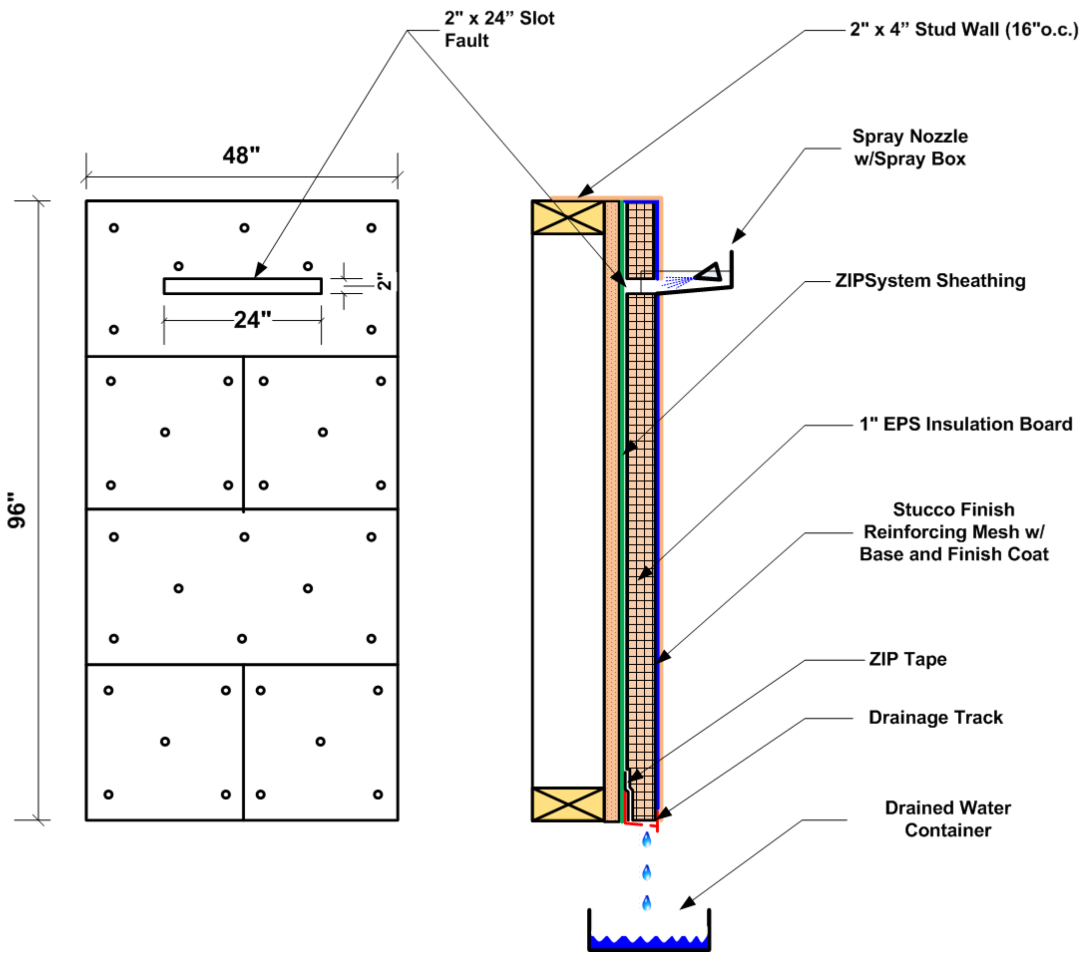

Figure 2: Drainage Efficiency Test Assembly According to ASTM E 2273.

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