Rainwater Management – Exterior Wall Systems

INTRODUCTION

Rainwater management is a critical component of building enclosure design and is essential to the long-term durability, energy efficiency, and performance of exterior wall systems. Modern building codes and industry standards recognize multiple approaches to managing rainwater, each based on established building science principles and intended to accommodate the characteristics of different wall assemblies and cladding materials. Proper selection and detailing of a rainwater management strategy should consider factors such as climate, exposure, material properties, constructability, and code compliance.

The following describe and summarize four common rainwater management methods for exterior wall systems:

BARRIER OR SURFACE SEALED

Systems designed to deflect water at the exterior surface and not allow water to penetrate the wall assembly. Barrier Exterior Insulation and Finish Systems (EIFS), which are defined in ASTM E2110 are an example of a surface sealed system

MASS WALLS

Systems, such as Concrete Masonry Units (CMUs), that absorb and store some rainwater that bypasses the exterior or outermost surface of the wall that later dries.

RAINSCREEN (DRAINED AND VENTILATED)

Systems that include a water resistive barrier, drain incidental rainwater that bypasses the exterior or outermost surface of the wall and passively ventilate the drainage cavity or gap. Rainscreen principles (drainage and ventilation) are sometimes incorporated into exterior walls that allow or anticipate rainwater will bypass the outermost surface or face of the wall such as open joint systems, lap or panel siding, and absorptive claddings. To ventilate the cavity, Rainscreens have additional design and installation considerations such as the following which can result in added complexity and increased costs:

- Open detailing at the top and bottom of walls, openings, etc. to ventilate the drainage cavity
- Clips, brackets or other mechanisms to attach the cladding which may be thermally conductive
- Mitigation of fire risk of the open, ventilated cavity
- Use of specialty products such as trim accessories for ventilation and additional materials such as thermal insulation, furring strips or drainage mediums to create the drainage cavity

DRAINAGE

Systems that include a water resistive barrier and means to drain incidental rainwater that bypasses the exterior or outermost surface of the wall. Examples of common drainage wall systems include EIFS with Drainage as defined in ASTM E2110 and masonry cavity walls. Definitions, prescriptive, and performance-based requirements for EIFS with Drainage have been in the International Building and Residential Codes (IBC/IRC) since 2009. Rainscreen principles are not typically incorporated into EIFS with Drainage since the systems are comprised of low moisture absorbing

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materials and an outer surface that provides a continuous barrier to rainwater. Most EIFS with Drainage systems are attached with an adhesive applied to the insulation board in a notched trowel configuration which creates channels for drainage of incidental moisture (see Figure 1). Mechanically fastened EIFS with Drainage is another option, however adhesively fastened systems are generally more commonly used because of efficiency in construction, enhanced thermal performance, generally higher wind load resistance, and lack of fastener penetrations through the air and water-resistive barrier. Additional features of adhesively fastened EIFS with Drainage systems are as follows:

- Easy integration of the water resistive barrier coating with other building enclosure elements such as flashings, rough openings, penetrations, etc.
- Maximized wind load capacity compared to mechanically fastened systems.
- Superior air barrier performance provided by the monolithic water-resistive barrier coating.

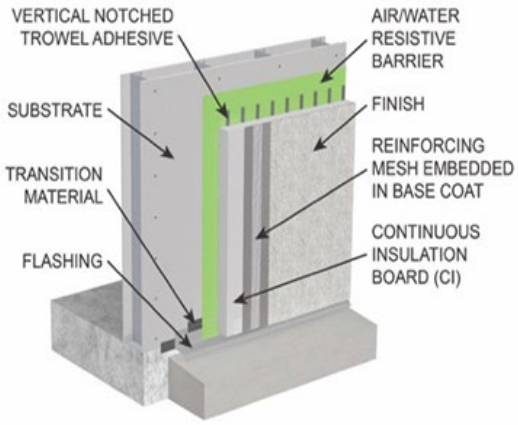

Figure 1: EIFS with Drainage/Notched Adhesive

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