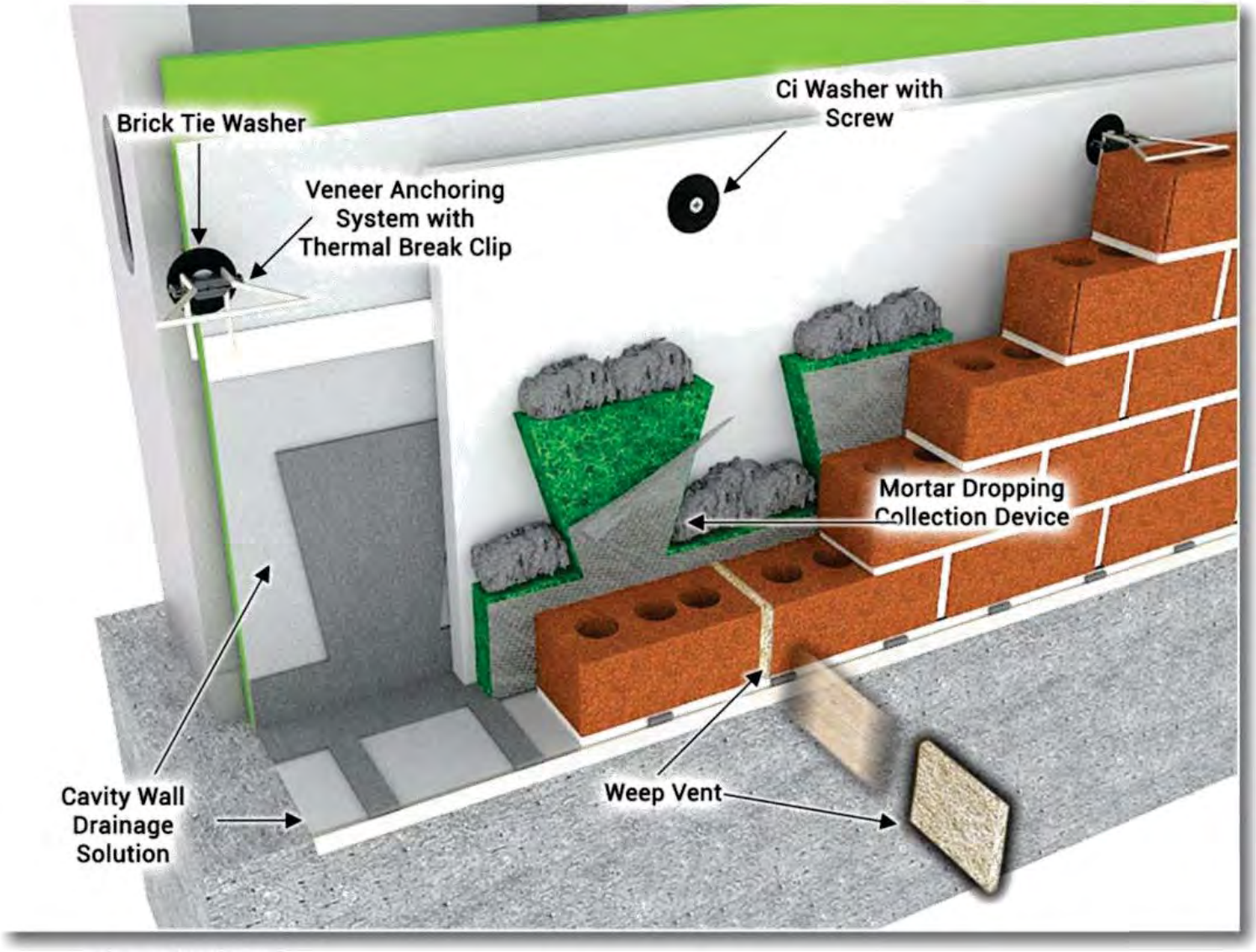

Masonry Cavity Wall System

The Building Envelope: Buzzword or Trend?

YOU MAY HAVE NOTICED AN INCREASE IN THE USE OF THE WORD "SYSTEM" LATELY. As you read through the articles and glance at the various advertisements, you may notice the "systemization" theme repeated over and again, and a growing use of the term. What exactly does "system" or "systemization" mean?

The authors define a system as a complete combination of various parts, pieces and components that perform a specific set of functions better as a whole than individually. We define systemization as the creation of a system.

BY ART FOX, DAVID SANCHEZ AND JASON WIGBOLDY

Fully accessorized brick veneer cavity wall with mineral wool insulation, insulation fasteners, thermally efficient veneer anchors, mortar dropping collection device, and panelized flashing that incorporates drainage, ventilation, and termination bar.

Systemization in building construction has historically been the main role and function of the architect, engineer or designer. When you stop and think about the individual parts and pieces that make up a sustainable, well-functioning building, you begin to realize the complex task of designing even a small structure. Every building requires interrelated systems constructed with many separate parts. As new energy codes demand higher performance and reduced energy consumption, designers and builders will be forced to design more complex systems to build it right.

Luckily for architects and builders, a trend is developing in the industry for building product manufacturers to move toward true systemization.

The building envelope

THE EXTERNAL BUILDING ENVELOPE is, perhaps, the most punished section of a building. Its proper design is one of the most challenging to create. It must be designed and built to withstand the fury of wind-driven rain, the heat of a baking sun and relentless freeze-thaw cycles, all while looking good and keeping the occupants safe and comfortable throughout the building's lifetime. Industry leaders have taken on the responsibility of designing, assembling and fully testing wall systems that comply with the 2012 International Energy Conservation Code (IECC 2012) and code 285 from the National Fire Protection Agency (NFPA) fire safety standards.

Insulation and air/weather barrier manufacturers lead the pack in building wall envelope systemization as the penetrations and potential thermal shorts caused by doors, windows, insulation fasteners, cladding anchors, etc. must be properly detailed to maintain building envelope performance and code compliance. Furthermore, the wall must be able to "breathe" and dry itself out from the moisture that inevitably gets through the cladding. This can be achieved with properly detailed drainage and ventilation planes, flashings and weeps.

The industry has developed specific tests to ensure individual components function together as a complete system. The most commonly used wall assembly tests include ASTM E-2357 for air penetration resistance, ASTM E-331 for water penetration resistance, and NFPA 285 for fire safety. It's important to note that these tests are for systems, not individual components; therefore individual components can't conform to these tests – only systems can.

The authors have worked with manufacturers of insulation and air barriers to help design, construct and test many wall systems, and have witnessed firsthand how even subtle differences in a component design can alter the overall performance of the wall system. Take, for example, brick-veneer anchors, insulation fasteners, and moisture drainage components.

The increasing use of continuous rigid insulation and weather resistive barriers (WRB) requires that brick veneer anchors transfer the lateral load directly back to the structure. This anchor design prevents dynamic loads from compressing the insulation and damaging the WRB, while minimizing energy loss from thermal bridging. The insulation must be secured with high-performance "ci" washers and screws to seal each penetration against air and moisture for true long term system performance.

Air barrier sealing washer and screw attaching foil faced continuous insulation directly to steel studs with auto-feed screw gun.

Thermally efficient single barrel veneer anchor including thermal break technology and air barrier sealing washer.

Consider the challenge this poses for today's designers. The average four- X eight-foot sheet of insulation requires around 28 system-tested fasteners. On a typical 50,000-square-foot building, that translates to more than 43,000 penetrations of the insulation and the air and weather barrier. That is a scary number of penetrations and a huge risk for leakage if you use a fastener or anchor that is not system tested and approved.

Earlier cavity wall designs allowed the use of pea gravel to collect the mortar droppings and present the moisture within the cavity a way to drain to the outside. Today, solutions are available that combine a term bar, drainage mat, weep tabs, pre-formed laps , drip edge and drainage membrane into a factory-manufactured and -tested system that manages the moisture at the base of the cavity wall. Fully tested brick veneer cavity wall systems will include specifications for unique moisture drainage and mortar dam protection products, including panelized solutions to minimize field assembly errors or omissions.

Energy codes in your area also may require the use of continuous rigid insulation beneath adhered masonry such as stone veneer. This creates unique challenges on how to properly attach the lath to support the cantilevered weight of the veneer, maintain the integrity of the weather barrier, and minimize energy loss through thermal bridging across the fasteners.

Furthermore, stone veneer is a porous cladding, so it is essential to create a continuous drainage plane behind it to shed water and enable ventilation. Adhered masonry wall systems are being developed to address these challenges, including lath combinations that come with an integrated drainage and ventilation mat. Hybrid fasteners also have been developed to attach the lath, reduce thermal bridging, and seal the fastener penetration.

Air barrier sealing washers and screws, thermally efficient veneer anchors, and panelized flashing that incorporate drainage, ventilation, termination bar, and drip edge complete this fully accessorized and continuously insulated wall system.

A truly systemized approach to the building envelope requires more than just a few compatible components; it requires complete specification, complete detailing, and complete testing of a fully assembled wall system. Complex systems like building envelopes have many components, so it's unlikely that a single manufacturer will make all the specialty components necessary for a truly complete wall system.

The best systems will utilize the best components available from multiple manufacturers with proven records of performance and value. Luckily for the entire industry, building science leaders are working together to systemize and test complete wall systems to ensure constructability, compatibility and long-term performance. The demand for more energy-efficient walls with continuous insulation and air barriers has spurred this trend.

Systemization benefits both designers and contractors. Specifying a tested and proven system reduces both the designer's and the contractor's liabilities by providing written assurance that all the components are compatible and will perform as required. Whether you are responsible for designing a structure, distributing the material, or constructing the wall, know that complete wall systems with purpose-built accessories and components have been system designed and tested to minimize your liability exposure while ensuring that building and energy codes are being met or exceeded. Next time you see individual components being advertised or sold as a "system" stop and ask yourself, "What is a true system?" **MAS**

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