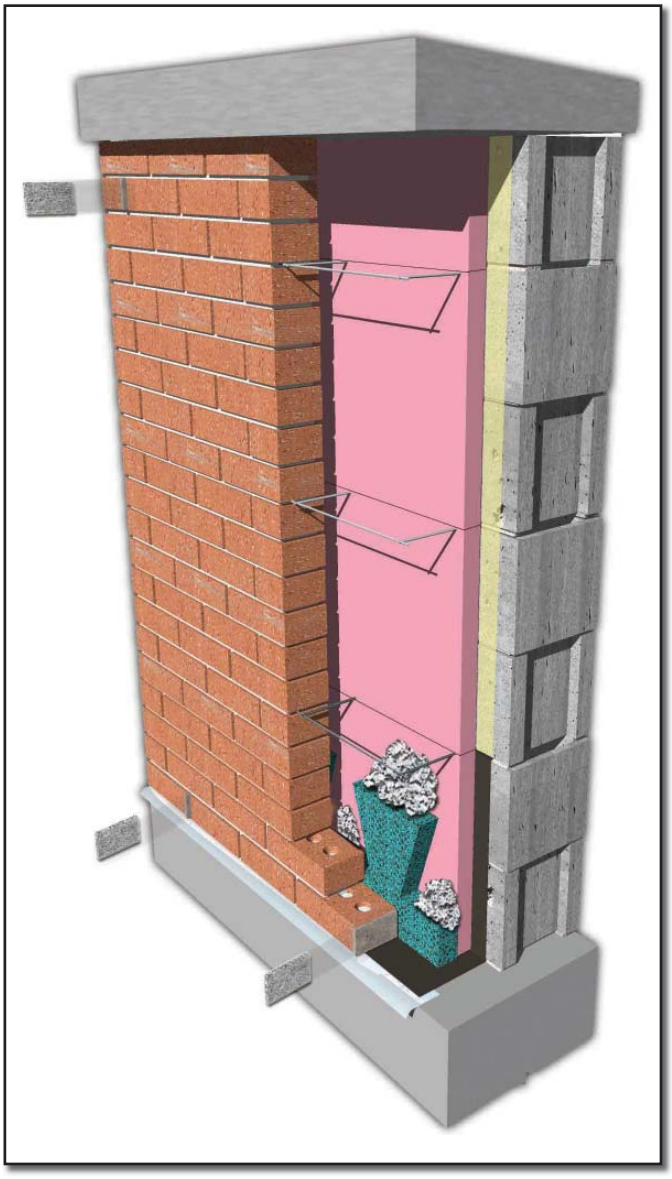
The Complete Drainage/Ventilation System

Another Component of a Successful Cavity Wall Design

By Chris Bupp

Cavity wall designs continue to change and evolve with the use of air/vapor barriers, improved brick/wall ties, various types of rigid and spray insulation and control/expansion joints. Because brick veneer walls will crack and leak to some degree, one thing that has remained constant is the importance of an effective drainage system. This system must be able to keep the cavity free of mortar droppings that could dam up the cavity, as well as providing free-flowing paths for water to exit the wall. Since mold has become the buzzword for 21st century construction litigation, many designers and contractors are not only concerned with getting liquid moisture out of the cavity, but also creating open channels for airflow to help dry out wall components.

The federal government has mandated a 25% reduction in the use of fossil fuels to heat and cool public office buildings by the year 2010. The result has been the adoption of air/vapor barrier codes as part of the energy code in states like Massachusetts and Wisconsin, which are similar to codes that have been in place in Canada for a number of years. Not only do these "new" designs incorporate increased thermal performance, but they also promote the use of airflow within the cavity compartment for drying purposes and pressure equalization. Differing climates across the country require careful consideration in determining the most effective wall assembly for your particular area. The combination of increased airflow along with an effective drainage system can dramatically improve the functionality of today's cavity wall systems. Remember, studies have shown that 90% of masonry wall failures are directly related to moisture! Another design change seen across the country is the use of a 2-inch open clear space in the cavity to provide additional protection from moisture infiltration plus improved airflow through the cavity. This 2-inch open cavity design is believed to be more energy efficient, plus the wider cavity helps to prevent the "bridging" of mortar that could encourage passage of moisture to the back-up wall.



From the early days of cavity wall construction, architects and masons saw the need for effective drainage. For many years, pea gravel was the product of choice for drainage and keeping weep holes open and free flowing. In time, it was recognized that pea gravel only served to dam the mortar droppings up higher in the cavity, and did not maintain an open path for water passage. Eventually, synthetic mesh materials with an effective shape and 90% open weave were introduced to catch and break up mortar droppings at two distinct heights, thus ensuring a clear path for water to migrate around the droppings and out of the wall.

Another major component of the "drainage system" are the weeps, which are located at the bottom of each cavity section and spaced either 16 or 24 inches on center. Once again, the evolution of weep materials has gone from cotton sash cords and plastic tubes that are very easily clogged by insects and debris, to full head joint products made of plastic, aluminum or synthetic mesh. These larger weep products provide greater protection from clogging and also allow for better ventilation. Completely open head joints are also used on occasion. A recent change from the Brick Institute of America (BIA) is to no longer recommend the use of plastic tubes as weeps. This, once again, underscores the importance of full height weeps to allow for better drainage and airflow.

Recently, the idea of adding vents at the top of each cavity compartment has become more popular. Many times these vents can be the same material as the weeps. Spacing of the vents at the top of the wall can be the same as the spacing for the weeps, and should be placed 2 to 3 courses below the top of the wall and staggered in a way to not directly line up with the weeps from the floor above. This ensures that water does not exit the weep system on one floor and enter the vents on the floor below. In multi-story buildings, the vents should be placed 2 to 3 courses below the shelf angle above. Because shelf angles close off the cavity at each floor level, it is extremely important to design each floor as its own separate wall section with drainage, ventilation, flashings, etc. These vents working in conjunction with the drainage system create an airflow avenue to further ventilate the cavity area. This additional airflow

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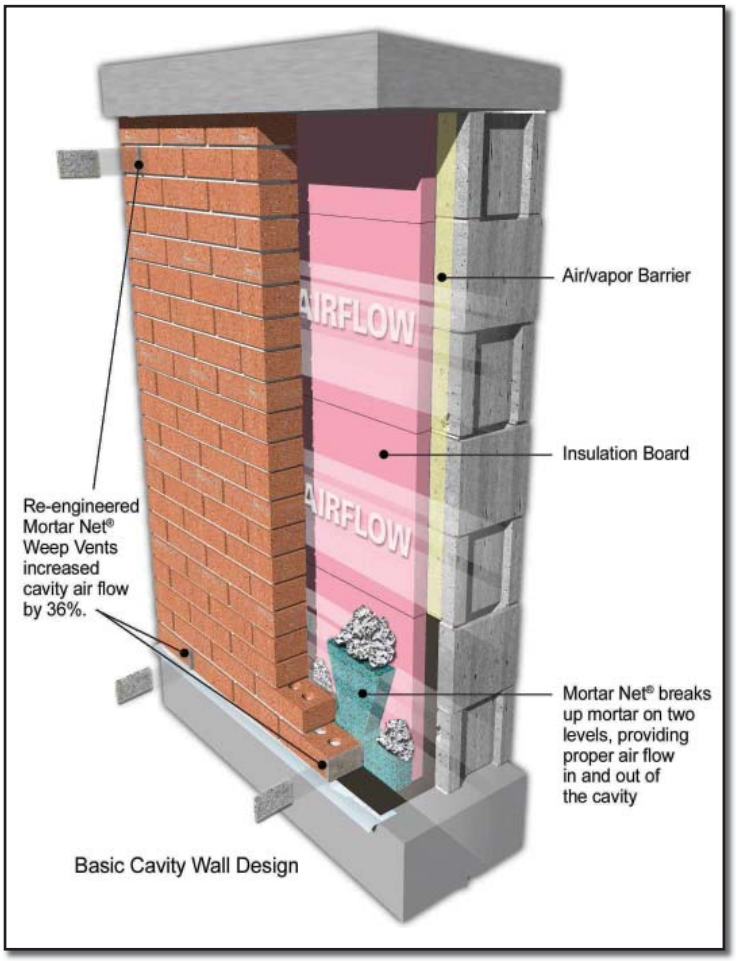

Basic Cavity Wall Design

provides many benefits, including drying out the components within the cavity much more quickly which can dramatically reduce the opportunity for mold formation. Independent testing has shown that these vents can increase airflow through the cavity by up to 46%. This airflow also can help to balance air pressure differential between the outside air and the air inside the cavity. The benefit here can be a major reduction of moisture drive to the inside of the building. The impact of introducing more airflow into the cavity creates a need for independently tested "systems" that provide both drainage and ventilation.

Because of the importance of these issues, industry standards are needed to determine the effectiveness of these systems, and manufacturers that are truly interested in improving masonry construction will help to establish high standards and design products that will meet and exceed those standards. Can these products and systems meet minimum recycled content criteria to be considered a "Green" building material? Does the product fill the entire depth of the cavity to impede mortar dropping from falling in front or behind the material? Has the drainage system been independently tested as a "system" to determine their value to the overall wall assembly?

Of course, the drainage/ventilation system is only as effective as the flashing system that it works in conjunction with. The specification and quality installation of a proper flashing system is critical to the success of any cavity wall design. Many times, an improperly specified or poorly installed flashing system can render the best drainage/ventilation system totally ineffective. There are many types of flashing products on the market, and the design of the wall assembly may determine the most appropriate flashing material. The entire flashing and drainage/ventilation concept has now started to make strides into residential construction as well.

A "drainage/ventilation system" should include an effective mortar collection device, weeps at the bottom and vents at the top of the wall. Contractors and designers should consider a system approach to assure that all components will function properly together. This complete system, along with a quality thru wall flashing system, should be a major part of any cavity wall design. Even though these components are a small part of the cost of a masonry wall, more designers and contractors are realizing their overall importance to a healthy and functioning cavity wall. ▪

With 20 years in the industry, Chris Bupp currently serves as a Regional Sales Manager for Mortar Net, and has been in charge of product testing and technical issues. Chris is also a member of the Air Barrier Association of America (ABAA) and active in the Construction Specifications Institute (CSI).

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