

Fluid-Applied Air and Weather-Resistive Barriers: The Better Choice

By John Chamberlin

Sustainability is a much talked-about concept in building design today. At a very high level, sustainability is described as the ability to endure. When considering a living space, that ability to endure might be applied to the building itself, the people who will ultimately occupy it, or even the world around the building. In fact, most of the time when the issue of sustainability is raised in regard to building design, the conversation quickly turns to efficiently using energy, protecting occupant health, and increasing the lifespan of the building. These concerns are driving changes in energy codes and construction practices.

Today, the 2012 International Energy Conservation Code (IECC), 2012 International Green Construction Code (IgCC), ASHRAE 189.1-11, and ASHRAE 90.1-2010 all have requirements for air barriers. Air barriers act as a key component in increasing the energy efficiency of a building. At the same time, many of these air barriers control moisture, reducing the risk of mold growth, decay, and corrosion within the walls. Fluid-applied air and weather-resistive barriers are still relatively new to the building products industry, but among the myriad of products from which designers have to choose, they might just be the best choice.

The Air Barrier Association of American (ABAA) defines an air barrier system as a system of building assemblies within the building enclosure—designed, installed, and integrated in such a manner as to stop the uncontrolled flow of air into and out of the building enclosure. Air leakage in a building can degrade the quality of an indoor environment by reducing thermal comfort levels and lowering the quality of air within a living space. Air leakage has also been shown to be directly related to moisture damage within wall assemblies, affecting the durability of the building materials within a wall. Moisture accumulation in walls and high relative humidity in interior spaces have been proven to occur as a result of air leakage. This accumulation of moisture and high relative humidity can lead to condensation and mold growth within building envelope assemblies.

Air barriers help to mitigate the risk of water infiltration by working in tandem with venting and compartmentalization to equalize the pressure behind the wall cladding with the pressure outside of the building. This reduces the pressure difference, a major cause for




Figure 1 – Residential fluid-applied barrier installation.



Figure 2 – Installed fluid-applied barrier.

water infiltration into walls, between the inside and the outside of the wall.

Perhaps most surprising, however, is the link between air leakage and the energy efficiency of a building. A study done by the National Institute of Standards and Technology (NIST) and prepared for the U.S. Department of Energy reported that including a continuous air barrier system could reduce air leakage in a building by up to 83%. This reduction of air leakage can translate to as much as 40% savings on the heating and cooling costs of a building.¹ In 2009, the U.S. Army Corp of Engineers (USACE) began requiring that all new construction and building enclosure renovation projects be made airtight. A study by the Engineer Research and Development Center, Construction Engineering Research Laboratory (ERDC-CERL), reported that this requirement for airtightness had already yielded more durable buildings that required less energy to operate.²

The construction of an airtight building envelope greatly reduces the risk of moisture problems as a result of air leakage and condensation. However, airtight construction may be less capable of drying than air-porous construction in the case of water leakage or other unplanned circumstances that might allow water to enter the wall assembly. Water is able to penetrate the building envelope through a number of different means. Wind may drive rain through incidental cracks or holes in the building's cladding. Capillary action in porous materials or at cracks or holes may draw water

toward the interior. And of course, water vapor may be transported by air or by diffusion, which can condense on cold surfaces within the building envelope.

There are a number of products that may be classified as air barriers, including building wraps, fluid-applied barriers, interior drywall, spray polyurethane foam, XPS insulation boards, self-adhered membranes, and polyethylene sheets. However, not all of these can also be classified as weather-resistive barriers. In fact, the International Building Code (IBC), the International Residential Code (IRC), and the IECC have specific requirements that must be met for these products to qualify as both an air barrier and a weather-resistive barrier. Common tests, such as the American Association of Textile Chemists and Colorists' (AATCC's) Test Method 127, measure a product's ability to resist water penetration under adverse conditions, such as wind-driven rain, which is simulated by placing the product under hydrostatic pressure. Traditionally, asphalt-saturated felt, Kraft waterproof building paper, or building wraps have been used as the moisture protection component of wall construction. Installation of these types of barriers usually involves shingle-style lapping and mechanical fastening to the sheathing with nails, screws, or staples. While common, these installation methods disrupt the continuity of the air and weather-resistive barrier, and actually provide opportunities for air leakage and moisture intrusion.

The best choice for an air and weather-

resistive barrier is one that meets a number of durability requirements as well as being able to resist wind and rain loads. Common criteria to look for include resistance to puncture, resistance to pests, resistance to low sustained negative pressures from building stack effect and HVAC fan effect, ability to withstand stress from thermal and moisture movement of building materials and stress from building creep, resistance to mold growth, and resistance to abrasion.


Fluid-applied barriers are gaining in popularity in both commercial and residential construction due to their ability to form a full monolithic barrier, as well as their durability and the ease with which they can be applied relative to a more traditional wrap or paper product. A number of these products act as both an air barrier and a weather-resistive barrier. Fluid-applied barriers are generally rolled or sprayed onto sheathing or concrete masonry unit (CMU) backup. They fully adhere, becoming part of the structural wall.

Some fluid-applied barrier manufacturers utilize adhesion testing such as ASTM C297 to verify a full bond between the barrier and the substrate and often find that the adhesion may actually exceed the strength of the substrate itself. This is not the case with paper-type products, where material may tear or blow off the building, or with self-adhered membranes, where a loss of adhesion may cause edge peeling or a loss of the barrier altogether.

Because fluid-applied barriers are initially in liquid form, there is no lapping of materials that can create discontinuity of the barrier. Once a fluid-applied barrier is completely installed on the wall of a building, the material acts as a single monolithic barrier. Fasteners such as nails, screws, and staples are not needed to apply fluid-applied barriers, so additional holes where rainwater can enter are less of a concern. Also, because fluid-applied barriers may be rolled or sprayed, the possibility of installation error is greatly reduced. Proper

installation of paper-type products and self-adhered membranes frequently require cutting, folding, and the use of special tools and accessories. Improper installation of these barriers can be costly and time consuming to correct; and all too often, these details are ignored altogether.

Regardless of which type of product is being used, the benefits of air barriers and weather-resistive barriers are clear. Air barriers can increase occupant comfort within a living space, reduce energy costs by reducing heating and cooling loads, and reduce the risk of condensation caused by air leaks through the wall construction. Weather-resistive barriers minimize the risk of weather damage to construction materials during and after construction and reduce the risk of costly repairs and replacement of materials in the future. While proper detailing and sequencing by the design professional are always the first steps to building an efficient, sustainable building, choosing the correct components helps to ensure that the building will keep performing long after construction has been completed. In the case of air and weather-resistive barriers,

fluid-applied barriers are an easy choice to make. They are a cost-effective alternative to protection against air leakage and moisture damage, with clear advantages over more traditional products. 

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