

# How air & moisture leakage ruins buildings

## Air Barriers 101

9 basic points to remember

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## Air barriers for masonry cavity wall construction



Black mold in wall assembly.  
Photo courtesy of the American Phytopathological Society

In winter warm, moist inside air is drawn into wall assemblies on its way outside.

Warm, moist air escapes through any available opening — electrical and plumbing penetrations, for instance. In summer, the opposite happens. Warm, moist outside air is drawn into cooler, air-conditioned buildings.

It gets in through weep holes, failed joints, connections between walls and roof, or foundation and walls — or any other openings. Water from rain may also make its way in via penetrations in the wall assembly. When warm, moist air from inside or outside contacts the sometimes chilly surfaces in the wall, condensation occurs.

Wall components get wet. If they stay wet long enough, conditions for mold occur. Wet walls and leaking air make buildings more expensive to heat and cool. Your heated air in winter, and air-conditioned air in summer, streams out of a leaky building as effectively as if you left a door or window wide open.

And wet walls don't insulate as effectively as when dry. Both factors put a greater strain on the HVAC system, which reduces its service life. Leaking air bypasses HVAC air filters. It delivers air with contaminants and allergens straight to the occupants.

1. Air barriers avoid mold.
2. Air barriers save energy.
3. Mold thrives in a wet environment.
4. Building envelopes get wet when moist air enters and condenses.
5. An external air barrier prevents mold by:
  - keeping moist outside air out
  - reducing ex-filtration of moist inside air into the wall
6. Energy-efficient air barriers:
  - reduce natural gas costs by >40%
  - reduce electrical costs by >25%
  - earn LEED® certification points
7. Some air barriers are also vapor barriers.
8. Vapor barriers trap moisture in walls.
9. Vapor-permeable air barriers let walls dry.



Asphaltic  
fluid-applied



Sheet wrap



Water-based  
fluid-applied



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# How air barriers work

*They do different jobs in different seasons*

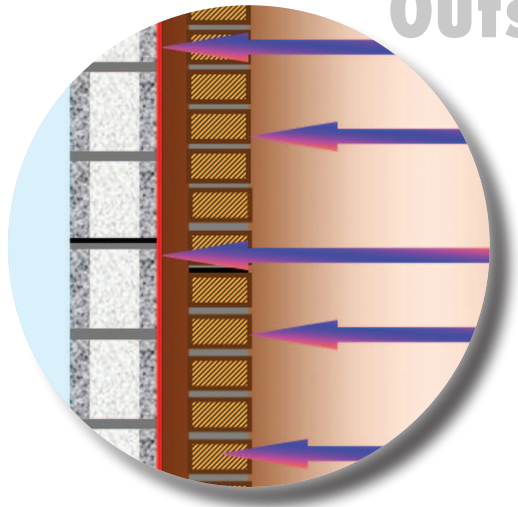
# How to choose an effective air & moisture barrier

*Not all air barriers are created equal*

# Vapor barrier or air barrier?



## Outside



**In warm weather**, the (red) air barrier stops warm, moist air from leaking through the sheathing or CMU backup into the wall assembly where it can condense. It also repels liquid water.

## “Big 4” checkpoints

To work properly, the air barrier you choose must meet the “Big 4” checkpoints.

### Durable

It’s durable — it resists weathering unprotected during construction delays — no rips, tears, or breaches of any kind or size are allowed, no matter what. Overnight or for months, if need be.

### Structural

An effective air barrier is structural — it sticks so tight it takes on the structural strength of the sheathing or CMU backup. It won’t come off in wind during construction, or from air-pressure differentials after the veneer is up. If any part comes off, ever, during the life of the building, the air barrier won’t be effective.

### Continuous and seamless

Effective air barriers are continuous and seamless. They cover all the nooks, crannies, cracks and transitions of the wall assemblies, 100 percent. No gaps. No holes. No seams. No exceptions.

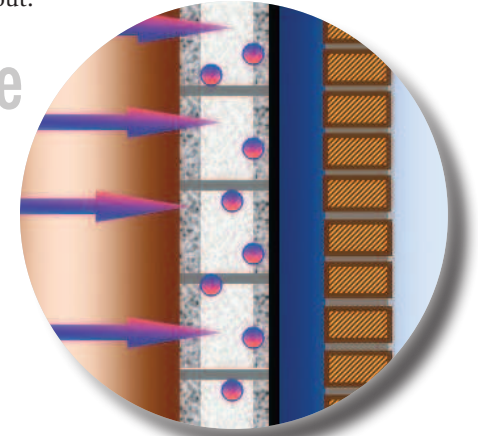
### Vapor-permeable

An effective air barrier is vapor-permeable — it doesn’t trap water vapor. Trapped water vapor may condense in the wall assembly, creating conditions for mold. A vapor-permeable air barrier lets the wall assembly “breathe,” which contributes to keeping it dry.

## Vapor barrier

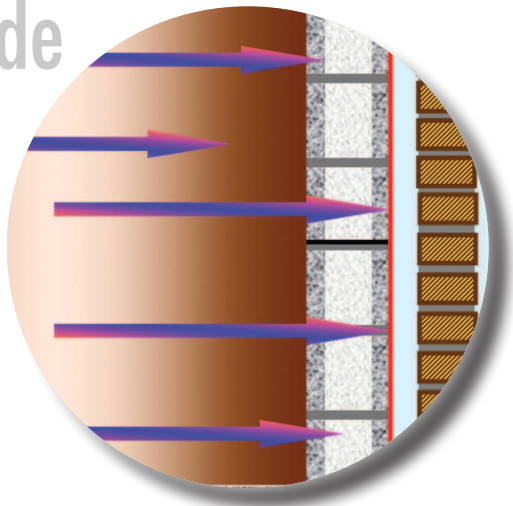
Since vapor barriers are vapor-impermeable, incoming water vapor or water vapor already in the wall will be trapped. As more vapor comes in, it builds up. When it condenses, it wets the wall components. Vapor impermeability keeps wet walls from drying out.

## Inside



*Although this (black) vapor barrier stops inside air from leaking out, it also traps water vapor in the wall. Unable to dry out, the wall assembly breeds mold.*

## Inside



**In cold weather**, the (red) vapor-permeable or “breathable” air barrier saves energy by stopping the flow of expensively heated air out of the building. It lets residual water vapor from inside diffuse through to harmlessly condense or dissipate in the air space behind the veneer. That vapor-permeability helps keep the wall assembly dry.

## Air barriers

Vapor-permeable or “breathable” barriers stop costly leaks of expensively heated or cooled air from streaming out of the building. It will let water vapor that gets into the wall diffuse harmlessly out again. It won’t trap vapor.

## The big difference

Correctly installed vapor barriers stop diffusion of water vapor through walls. However, studies have shown that diffusion is not a significant source of water ingress. According to the Brick Industry Association’s Technical Note 21, “Air leakage can carry several hundred times more water vapor than vapor movement.”

Since stopping air leaks turns out to be what’s important, some systems have dispensed with often problematic vapor barriers. They’ve turned to breathable air barriers, which are suitable for all climates.

**Always** insist on seeing technical data that verifies products meet the “Big 4.”