Step 6
Moisture Management

The 7 Steps of Building a Synergy Home

- Airtight Construction
- Fresh Air Ventilation
- Improved Thermal Systems
- Properly Sized, Designed, Installed, and Commissioned HVAC System
- Pressure Balanced
- **Moisture Managed**
- Combustion Safety

Moisture is the single largest factor limiting the useful service life of a structure.

Tolerance

- The ability of a home, assembly, or product to endure less than perfect design or installation.
- Our homes do not have to be perfect just tolerant.
- “The Seven Steps of Building a Synergy Home” builds overlapping tolerances into home construction.

The 4 major moisture transport mechanisms:

- Bulk transport
- Capillary transport
- Air transport
- Vapor Diffusion

Bulk Transport

- Rain Water.
- Proper grading and drainage, gutters and downspouts.
- Proper drainage of HVAC condensate away from the foundation.
- Manage it during construction.

House-wrap is a bulk moisture barrier. It will not stop air transported moisture or vapor driven moisture.

The Devil is in the Details with House-wrap Installation!

Notice the detailing around the doors and windows.

Damp-proofing crawlspace walls helps but it is not waterproofing.

Capillary Transport

- The ability of water to travel up against the pull of gravity through a porous material.
- Efflorescence – The white line visible in brick that provides evidence of capillary transport.
- Brick needs a 1” drainage plan free from mortar.
- Siding needs furring strips and to be back-primed on all 6 sides.

Moisture “wicking” up through the brick and concrete block.

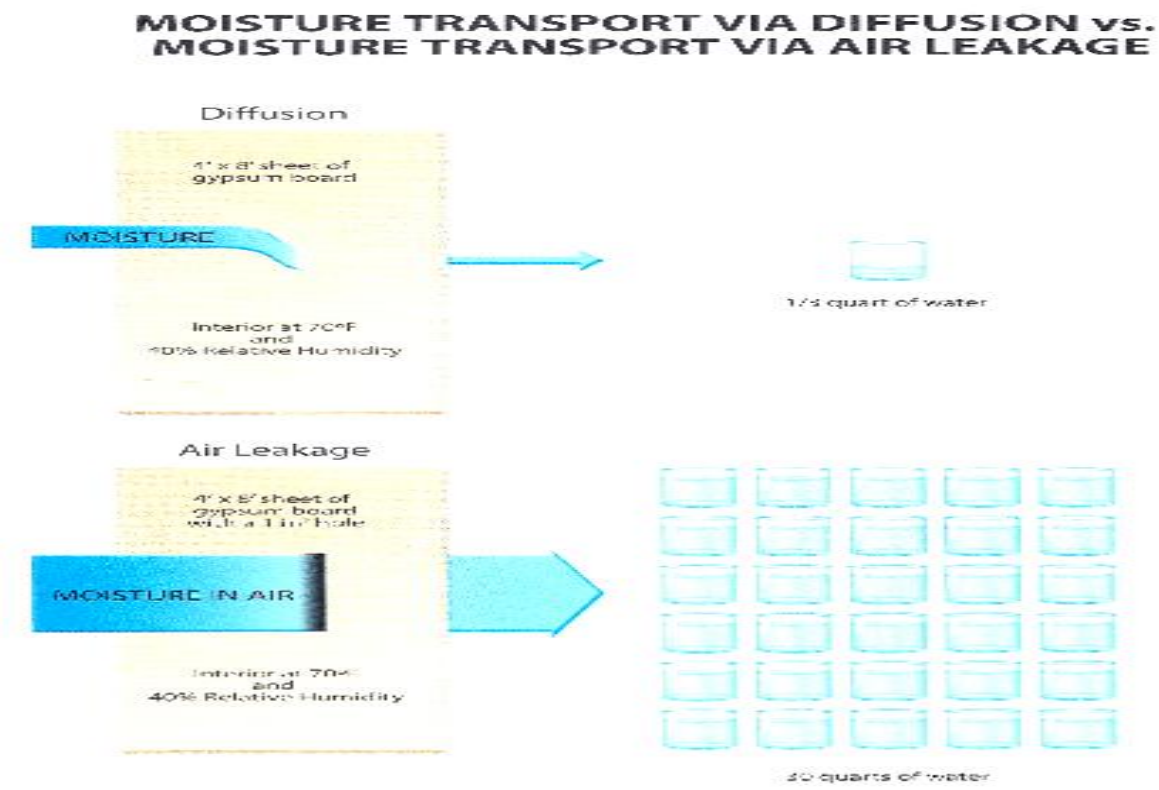
Air-transported Moisture

- People are overly concerned with vapor barriers and ignore air barriers.
- Is a much greater problem than vapor diffusion.
- Is influenced greatly by pressure differentials and air flow.
- Airtight construction and open cell foam stops air flow and air transported moisture.
- Tight ducts inside the building envelope, pressure balancing, and fresh air ventilation prevents negative depressurization which tends to pull moisture into the home.
- Weep Holes provide pressure equalization.

Air…

- Requires a hole and a driving force such as wind, the stack effect, and out of control fans.
- Always flows from high pressure to low pressure areas.
- Always seeks the path of least resistance.
- For every bit of air the exits a house, the same amount must be pulled into the house.
- Air that is pulled in often is unconditioned and comes from unintended places. It brings contaminants such as moisture, pesticides, odors, dust, insulation, radon, etc.

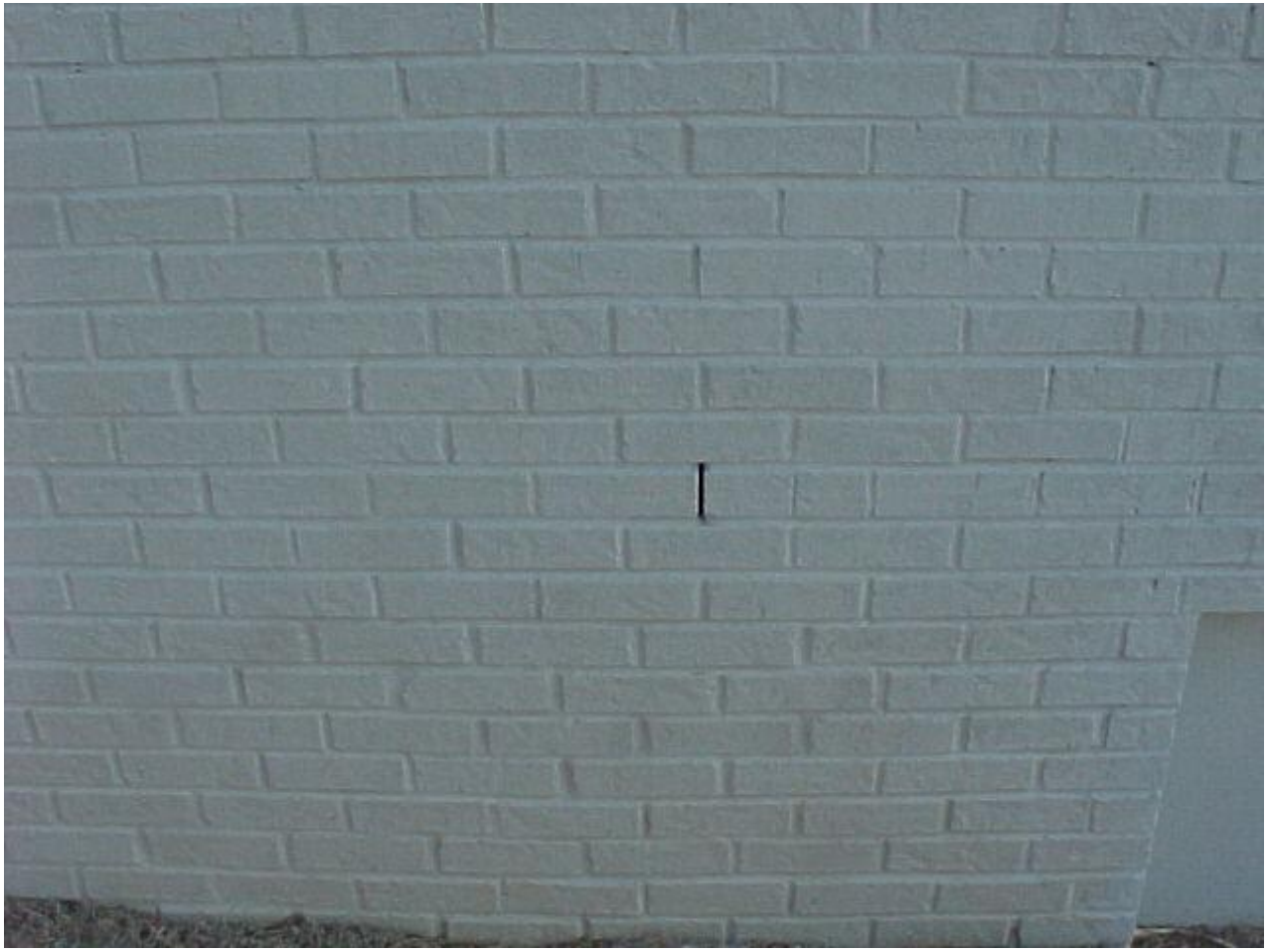
Air transported moisture is one of our biggest concerns. 1/3 quart of water vs. 30 quarts of water.



Vapor Diffusion

- Depends on vapor pressure differentials and the permeability of the material it is passing through.
- Limit water “pooling” near the foundation.
- Moisture moves from warm to cool, which in Alabama, means outside to inside the majority of the time.
- The code calls for vapor barriers on the “warm-in-winter” side.
- Let moisture travel through assemblies and then remove it.
- Do not trap it with barriers such as closed cell foam.
- Closed cell with insulated sheathing “sandwiches” and traps moisture.
- Vapor diffusion can be accelerated by “solar driven moisture”.

Weep holes in brick allow pressure equalization in the interior cavities which helps prevent vapor diffusion.



Brick must have an 1” drainage plane free of mortar droppings in order to prevent rainwater from wicking into the sheathing.

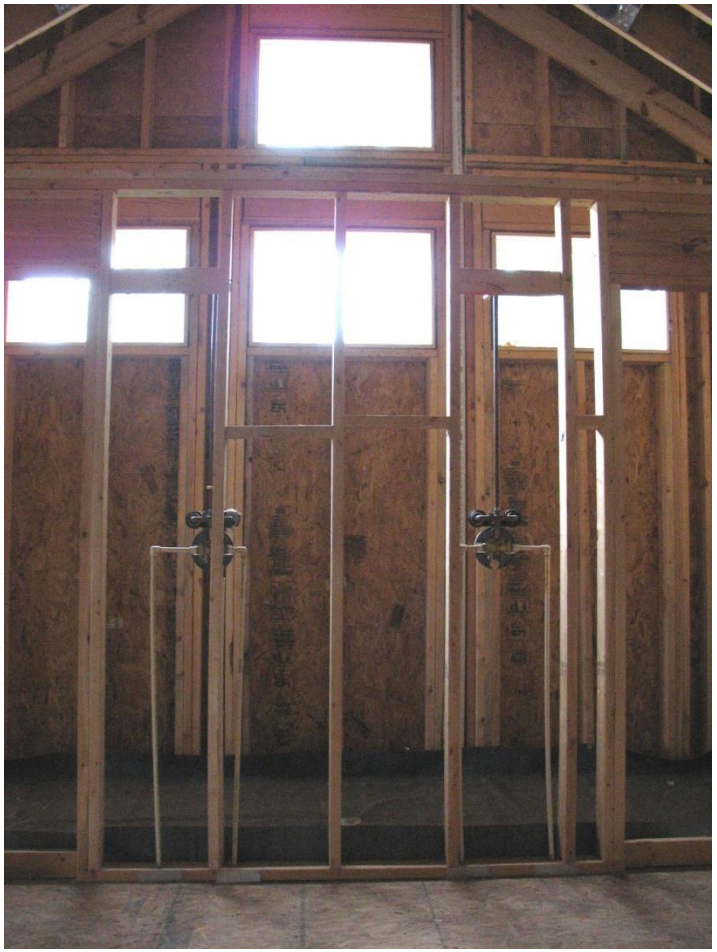
Control internally generated moisture.

- Hard duct bathroom, kitchen, clothes dryer exhausts in short, straight runs to the exterior of your house.
- Provide timers for bathroom exhausts.
- Drain HVAC condensate from the home and away from the foundation.
- Eliminate “house-vented” fireplaces.
- “Dryerbox” is a great product.

Could warm air delivered to the underside of cold sheathing cause problems?

Dryer vents ducted into the crawlspace

Never Put Windows In A Shower!



The Five Requirements for Unidentifiable Biological Growth (The "M" word).

- UBG spores are everywhere!
- Food – anything organic serves as mold food!
- Oxygen – it is essentially everywhere!
- Temperatures between 40F and 100F.
- Relative Humidity over 70% - This is the easiest preventative measure to control.

Relative Humidity

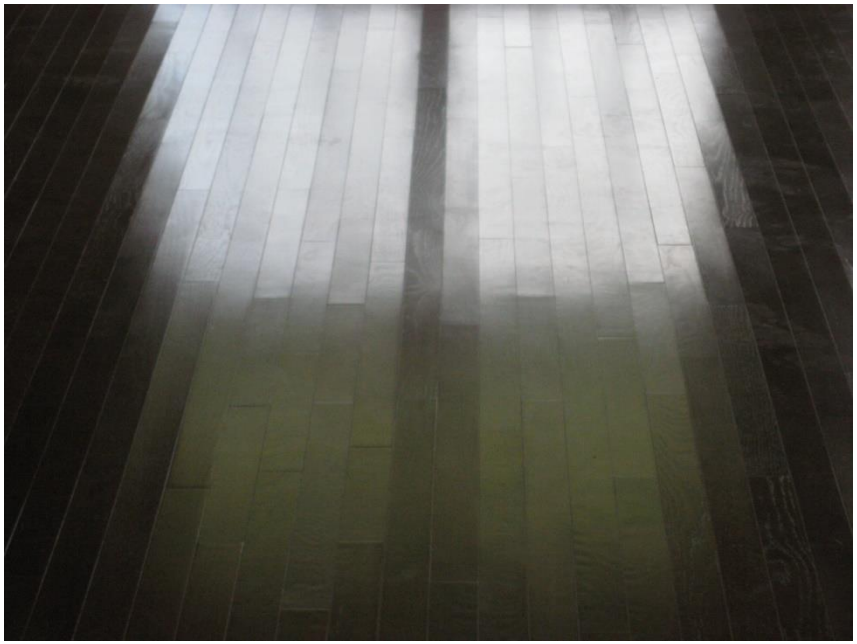
- The ratio of the amount of moisture a given volume of air contains to the maximum amount of moisture a given volume of air can contain.
- Warm air holds more moisture than cold air.
- The maximum amount of moisture a given amount of air can contain is 100% which is called its saturation point or dew point.
- If you decrease the temperature of air, the relative humidity increases.
- If you decrease the temperature of air enough, the relative humidity increases to 100% or its saturation/dew point.

Relative humidity continued

- Small amounts of moisture introduced in cold weather creates condensation.
- Do not close off rooms, especially closets on outside walls.
- Our biggest battle in North Alabama is to prevent hot exterior air in the summertime from hitting cool interior surfaces and condensing.
- During the few cold months, we battle to prevent warm interior generated moisture from condensing on cold exterior surfaces.
- Controlling interior moisture controls dust mites.
- Eliminate carpet.
- Understand a psychometric chart.

Install a closed, conditioned crawlspace and let us help you develop a moisture management strategy!

Cupping Hardwoods



Structural Issues