

BUILDER'S GUIDE TO ENERGY EFFICIENT HOMES IN LOUISIANA: AIR LEAKAGE AND SEALING - MATERIALS AND TECHNIQUES

By
Howard Hershberg, AIA

The *Builder's Guide to Energy Efficient Homes in Louisiana (Builder's Guide)* is being updated to reflect new code requirements. This is the fourth in a series of articles that will summarize the information in the guide and highlight updates.

Air leakage is a major problem for both new and existing homes. It can contribute 30% or more to home heating and cooling costs, create comfort and moisture problems and draw in pollutants. The reduction (or prevention) of air leakage requires a continuous air barrier. The air barrier creates a tight building envelope and minimizes air currents through the insulation, thereby helping the insulation to maintain the designed R-values.

The R-value for standard insulation drops if air leakage occurs through the material. To install a proper air barrier, seal all penetrations in the envelope and install a continuous air barrier material such as house wrap or drywall around the envelope. Air leakage is the result of holes and a pressure difference that forces air to flow through a hole.

A pressure difference is commonly caused by:

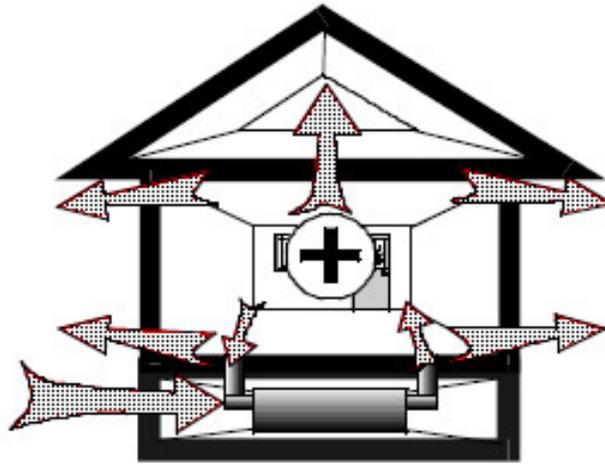
- Wind (Figure 1)
- Stack Effect (Figure 2)
- Mechanical Blowers (Figure 3)

Figure 1. Wind Driven Infiltration



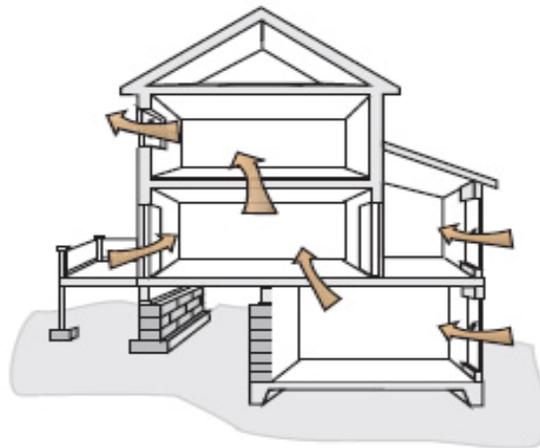
On average, wind in the Southeast creates a pressure difference of 10 to 20 Pascals on the windward side. However; most homes have only small cracks on the exterior, and winds are variable.

Figure 2. The Stack Effect



Leaks in supply and return ductwork can cause pressure differences of up to 30 Pascals. Exhaust equipment such as kitchen and bath fans and clothes dryers can also create pressure differences.

Figure 3. Mechanical System Infiltration



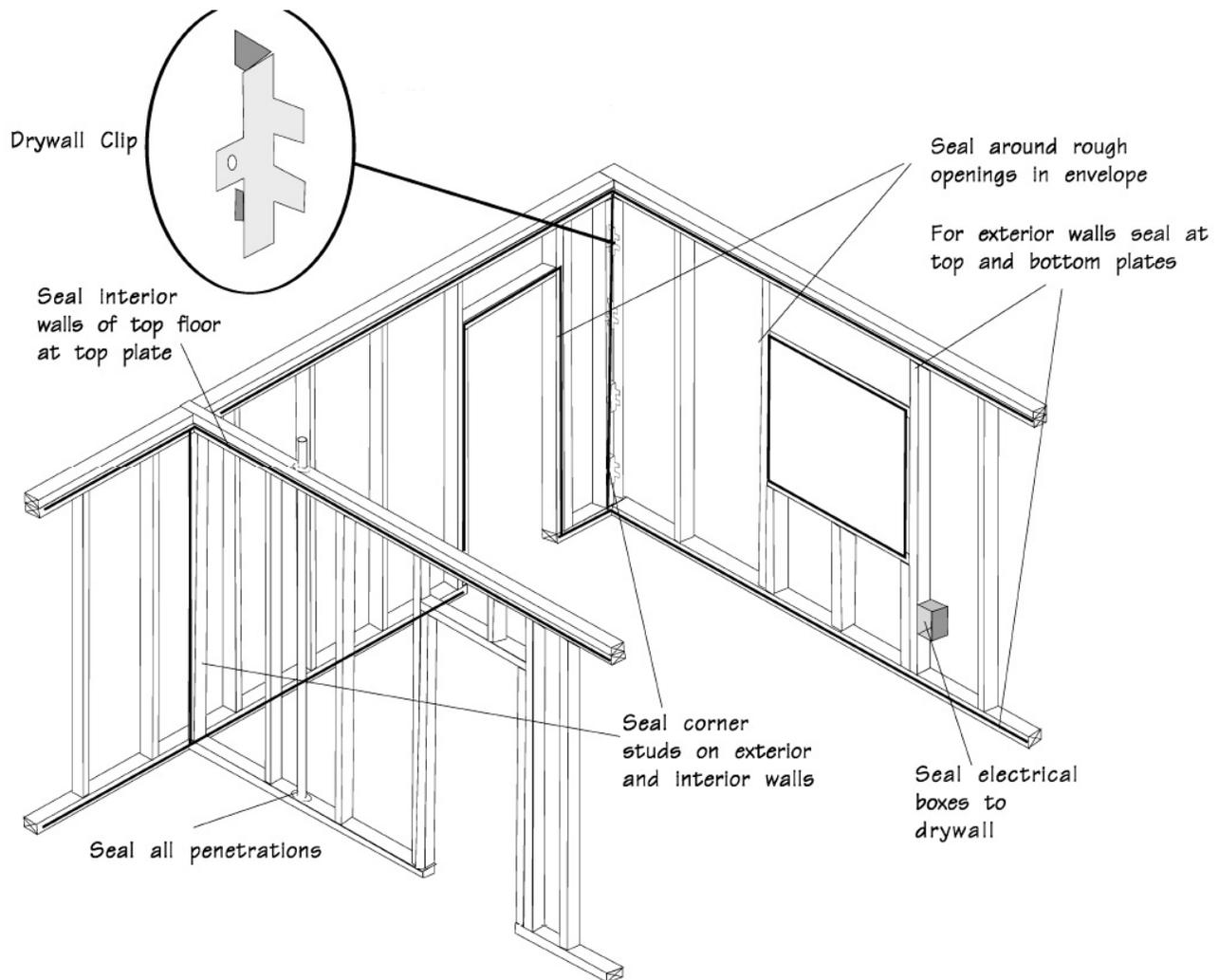
The stack effect can create pressure differences between 1 to 3 Pascals due to the power of rising warm air. Crawlspace and attic holes are often large.

The first step in creating an effective air barrier system is to seal off all of the holes in the building envelope. Concentrating on air leakage through doors and windows and ignoring effective air barriers will not make a house tight.

Most air barrier systems rely on a variety of caulks, gaskets, and weather stripping. They also may include sheet materials such as plywood, drywall, and housewraps. The additional cost for these materials can range from \$500 to \$700. However, the benefits they pay back to the owner in saved energy costs, healthy home environment, and improved indoor air quality (IAQ) is worth thousands of dollars over the life of the mortgage.

The airtight drywall approach (ADA) is an air sealing system that connects the interior finish of drywall and other building materials together to form a continuous barrier (Figure 4). ADA has been used on hundreds of houses and has proven to be an effective technique to reduce air leakage, as well as keeping moisture, dust, and insects from entering the home.

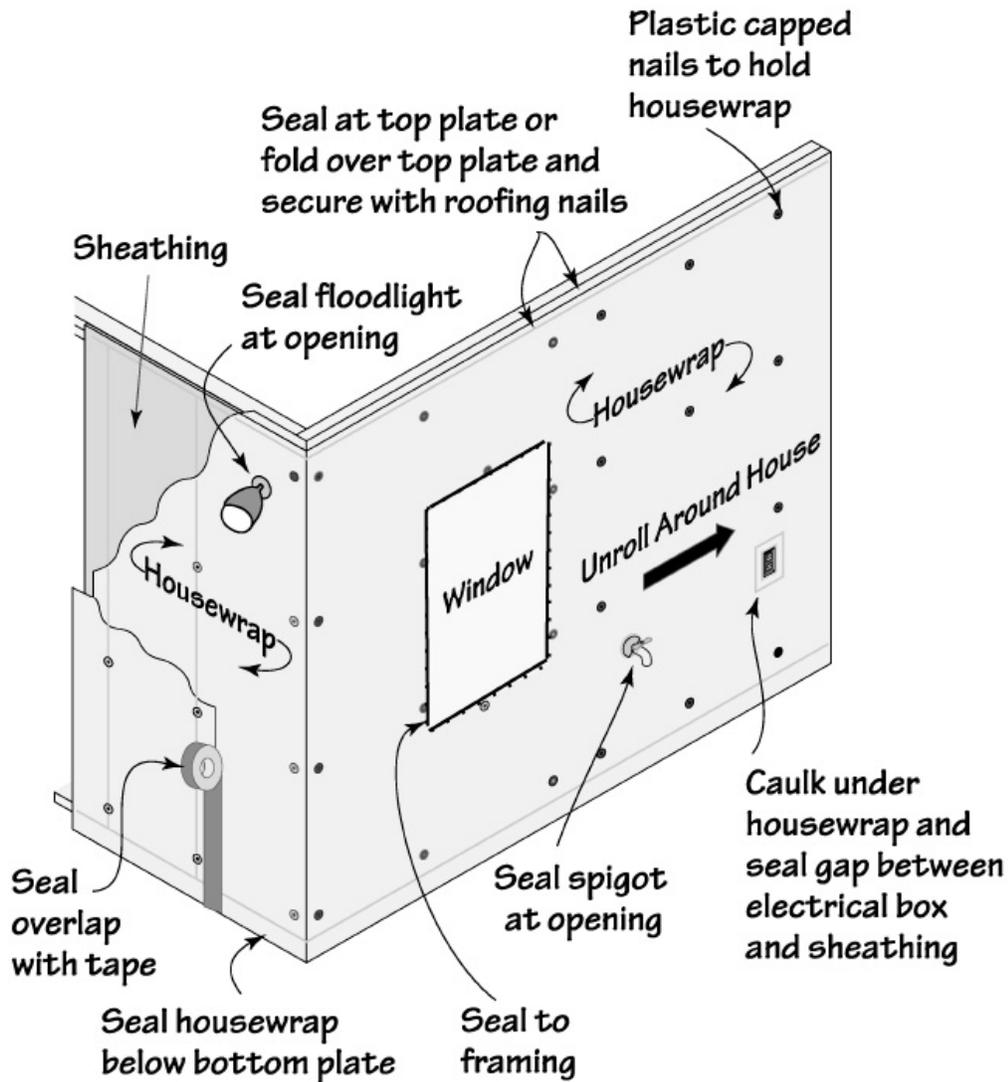
Figure 4. Airtight Drywall Approach Air Barrier



ADA uses either caulk or gasket to seal and to make the drywall continuous air barrier system. ADA gaskets have “memory” when they are compressed by the drywall and then when released they return to their original configuration. These gaskets may be installed before the drywall crew arrives. **However, they must be instructed to leave the ADA gaskets intact.**

There are several new housewraps on the market that can be used effectively as air barriers (Figure 5). Housewrap materials can reduce air leaks through exterior walls if installed properly. They are advantageous in Louisiana because they are permeable to water vapor, thus helping prevent moisture build-up in walls. (They seal out wind and rain, but allow the walls to “breathe” by allowing water vapor to pass through.)

Figure 5. Recommended Housewrap Installation Process & Procedures



More information on energy savings features, and the full text of the *Builder's Guide*, can be found on the DNR Technology Assessment Division website at URL: <http://www.dnr.louisiana.gov/tad>.