Money Isn't All You're Saving

Improve Energy Efficiency by Preventing Air Leakage

Builder Guide

DESCRIPTION

Air leakage is the unintended infiltration of air through the building envelope. If a house is not well sealed, it costs more to keep comfortable. In fact, loosely constructed houses often are difficult to keep comfortable, due to cold drafts, outside noise, and unwanted humidity. A critical part of an ENERGY STAR labeled home is tight construction designed to save money, improve comfort, and reduce pollution.

The amount of air infiltration in a house depends on two factors: 1) air leakage paths from the outdoors to the inside, and 2) difference in air pressure between outside and inside. Air leakage paths include cracks and penetrations in the building envelope (see diagram). These can be minimized through caulking and sealing. Pressure differences are caused by wind, temperature differences (stack effect), chimneys or flues, and equipment fans. House design and mechanical equipment selection affect the pressure differential across the building envelope.

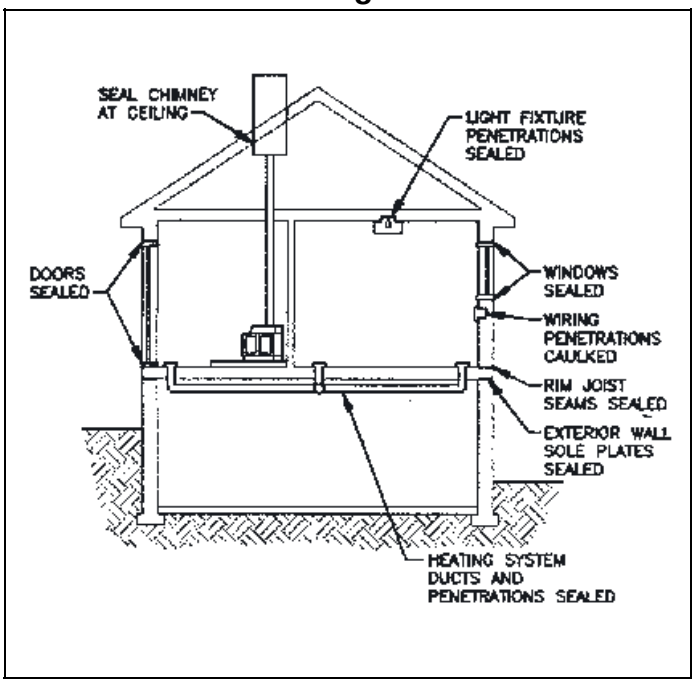
BENEFITS

If properly sealed and ventilated, an air-tight house reduces energy costs and improves comfort. Preventing air leakage is a cost effective way to improve the quality of the homes you build, increase customer satisfaction, increase customer referrals, and increase sales.

❑ Airtight construction is one of the most cost effective ways to reduce home energy costs.

Air leakage can account for 30 - 40 percent of home heat loss. Reducing this major source of heat loss is the first and most critical step in building an energy efficient house. In addition, performance of other energy efficiency measures, such as better insulated walls and high performance windows, is degraded when air leaks around or through them.

Air Leakage Paths



❑ Air sealing makes a tighter, quieter, more comfortable home.

Better quality construction is the result of carefully sealing all joints and penetrations. This eliminates uncomfortable drafts, promotes more even heating and cooling, and reduces outside noise.

❑ Air sealing improves indoor air quality.

Sealing joints and penetrations prevents infiltration of outdoor air pollutants and dust as well as reducing the potential for insect infestation. Air-tight construction also reduces moisture infiltration from humid outdoor air in humid weather.

INTEGRATION

- ❑ **Preventing air leakage means more than installing an air-infiltration barrier and using 40 tubes of caulk.**

The key to an efficient, high quality sealing job is to identify air leakage paths, determine the most effective sealing methods, and plan ahead for materials, timing, and responsibilities. Attention to several construction details can help ensure reduced infiltration and increased comfort. These include caulking and sealing of: sill plates, band joists, wall connections, window and door frames, drywall seams, plumbing penetrations and chases, electrical outlets, and recessed lighting penetrations.

- ❑ **Selecting one person to be responsible for house air-tightness can ensure that this critical job is done correctly.**

One way to accomplish air leakage control is to have subcontractors seal all of the joints and penetrations they create in the building envelope during their work. For example, plumbers can be expected to seal plumbing penetrations and framers can seal framing joints and seams as they work (see diagram on front page.) However, they may need special instruction, and it will be more difficult to verify that the work is done correctly. A more effective way is to make one person responsible for all air sealing. Having one person responsible for sealing air leaks makes it easier to ensure quality control, develop expertise in a critical skill, and control costs for time and materials.

- ❑ **Active ventilation can be provided in a tight house to ensure indoor air quality.**

With the proper design, a tight building envelope can provide improved indoor air quality and comfort. However, active ventilation may also be required to maintain adequate flow of fresh air into the home. Active ventilation systems can be designed and installed by an HVAC contractor. See “Active Ventilation”, “Continuous Exhaust Ventilation” and Heat Recovery Ventilation” fact sheets.

RESOURCES

- ❑ *Super Good Cents Builder's Field Guide* (Bonneville Power Association), 1992. Available at 206-216-4272.
- ❑ *NY Star Builder's Field Guide* (NY Star, Inc.), 1994. Available at 518-465-3115.
- ❑ *Energy Efficient Florida Home Building* (Florida Solar Energy Center), 1992. Available at 407-638-1000.
- ❑ *Canadian Home Builder's Association Builder's Manual*, 1994. Available at 1-800-346-0104.
- ❑ *Moisture Control Handbook: Principles and Practices for Residential and Small Commercial Buildings* (Lstiburek and Carmody), 1993. Available at 1-800-346-0104.
- ❑ *Advanced Air Sealing* Jim Maloney, Bonneville Power Association, 1993. Available at 1-800-346-0104.