

ATTIC AND RIM JOIST RETROFIT STOPS AIR INFILTRATION, CREATES BIG ENERGY SAVINGS

Background

As energy costs began to increase, many homeowners started searching for more energy efficient building trade tools to use in homes to offset the costs. In response to this trend, a retrofit project began on a 2,300 ft² home in Northeastern Ohio in November, 2008. In conjunction with this retrofit, a blower door test - an EPA Energy Star[®] recognized diagnostic method for measuring air exchanges - was conducted to pinpoint where air was infiltrating the home. This testing was performed by a certified third-party Building Performance Institute accredited Building Performance Analyst.



Problem

The blower door test was conducted to analyze the air infiltration, air exchanges and energy efficiency. Upon completion of the blower door test, the homeowner found that the average number of air exchanges in the house was 9.3 air exchanges per hour (ACH₅₀). The recommended Minimum Ventilation requirement for a house of this size is 6.3 ACH₅₀. After speaking with an HVAC specialist, the homeowner realized the high amount of air exchanges paralleled the recent high energy bills.

Solution

Handi-Foam[®] Spray Foam was used to seal and insulate the basement rim joist of the home, along with the attic, to stop air loss. Handi-Foam[®] creates an air barrier. The retrofit application took place in different phases.



Phase 1: The previous blown in fiberglass insulation was removed from the attic and the attic floor was left exposed. Another blower door test was conducted, with results showing an increase in air exchanges from 9.3 to 9.5 or a 2.5% increase. This result means the blown in fiberglass alone made an insignificant difference in preventing air exchanges and stopping air infiltration.

Phase 2: Using the Magnum[™] Heated Hose System, Handi-Foam[®] Spray foam was applied to seal the attic critical seal and thermal bypasses. The critical seal points included pipe penetrations, drywall to wood connections, junction boxes, can lights, soffits, and baffles. A 1" coat of Handi-Foam[®] Spray Foam was applied over the entire attic floor to create an airtight critical seal and to stop air infiltration, providing an R-value of 6.2. A blower door test was performed and the air exchanges per hour dropped from 9.3 to 7 or a 25% decrease, meaning the minimal amount of Handi-Foam[®] Spray Foam made a significant difference in preventing air exchanges from entering the house.

Phase 3: Additional insulation was required to meet local building codes R-value standards. Cellulose was added to the attic and applied directly on top of the foam - a process known as hybrid application. 3" of Handi-Foam[®] Spray Foam was sprayed in the rim joist of the house. A final blower door test was performed and the number of air exchanges dropped to 6.3 ACH₅₀, which from the start of the project lowered air exchanges by an astounding 32%.



Stopping air infiltration is the best defense against energy leaks. The Department of Energy estimates that up to 40% of energy loss in a home can be contributed to air infiltration. Creating an air barrier is vitally important in rim joists and attics because moist air can migrate through fiberglass insulation, creating condensation. This condensation or moisture can eventually lead to mold and mildew problems. This retrofit not only increased the home's energy efficiency significantly, it will also lead to a more comfortable living environment within the house. In January of '09, the average temperature in Northeast Ohio was 28.9°, six degrees colder than January '08, yet the home experienced more than \$200.00 in energy savings.

Handi-Foam[®] Spray Foam products are composed of a diisocyanate, hydrofluorocarbon blowing agent and polyol. Consult the product's MSDS (Available at www.fomo.com) for specific information. The urethane foam produced from these ingredients will support combustion and may present a fire hazard if exposed to a fire or excessive heat about 240°F (116°C). Wear protective glasses or goggles, nitrile gloves, and clothing that protects against dermal exposure. Use only in a well ventilated area with certified respiratory protection or a powered air purifying respirator (PAPR). For professional use only.