Air Barrier Properties and Building Envelope Science

Stopping unwanted air infiltration into residential homes and commercial buildings is one of the most important and cost effective ways to reduce heating and cooling costs, improve indoor air quality, and provide a more durable, energy efficient construction. State-of-the-art building science is focused on increasing energy efficient construction through the design of, among other things, superior air barrier systems within the building envelope. The building envelope is the boundary which separates outside air, moisture, wind, etc. from the inside conditioned space. In fact, the importance of the air barrier is such that current and future air barrier testing standards are currently being incorporated into new residential and commercial building codes. The new codes will no doubt significantly impact construction techniques in the coming years.

ASTM E 283 is the accepted standardized test method for air barrier components and systems. This test determines the rate of air leakage through a material under a specified pressure difference across the specimen. Measurements using ASTM E 283 show that Handi-Foam, when properly applied, reduces the air leakage rate to less than 0.01 cubic feet per minute per square foot (0.05 Liters/second/square meter), below accepted building code requirements. The actual test results for Handi-Foam One and Two-Component foam and Handi-Seal Window and Door Sealant are as follows;

Air Leakage rate at;
1.57 psf (75 Pa) pressure differential= ‹0.01 cfm/ft^2 (0.05 L/s/m^2)
6.24 psf (300 Pa) pressure differential= ‹0.01 cfm/ft^2 (0.05 L/s/m^2)

These results show that Handi-Foam One-Component and Two-Component froth foam systems provide an excellent barrier against air infiltration. In fact, due to polyurethane foam's unique ability to expand, bond, and seal, Handi-Foam products are *the most effective unifying components* for the completion of an effective air barrier system.

Numerous scientific studies have shown that energy usage can be dramatically reduced by sealing against unwanted air infiltration (as much as 55% reduction in air leakage rate @ 50 Pa pressure differential is common). The United States Department of Energy (DOE) supports research dedicated to meeting its goal of reducing energy consumption in buildings 25% by 2020, and 50% by 2030. The DOE states that up to 40% of heating and cooling costs are due to air infiltration in the building envelope. A recent NAHB study (1997) showed that a good caulk-and-seal (foam-and-seal) package reduces annual heating and cooling costs from $150 - $300, on average.

An effective air barrier also prevents a majority of the damage done to buildings associated with moisture. Most of the moisture (90%) which ingresses into the building envelope is carried by air. Air-borne moisture can condense on colder surfaces, leading to rot and deterioration of the substrate, and providing a necessary growing condition for mold. Thus, Handi-Foam products are important components of an air barrier system which helps prevent decay, deterioration, and

mold. Building scientists, specifiers, and builders are convinced that an effective air barrier is the most cost-effective way to create durable, healthy, energy efficient buildings. For more information see the on-line resources below:
http://www.buildingscience.com/default.htm
http://www.nibs.org/
http://www.airbarrier.org/
http://www.eeba.org/