INSULATION IS NOT ENOUGH

Energy-Efficient Homes Need Air Barriers

enter the insulating air barrier concept

BASF Polyurethane
Foam Enterprises LLC

Rising energy costs are fueling a demand among educated homebuyers for energy-efficient, sustainable, comfortable houses. Incentives from all levels of government, as well as local utilities, help raise awareness, desirability and affordability of energy-efficient homes.

Is it any wonder that developers, architects and contractors are actively seeking cost-effective, environmentally responsible ways to build homes with reduced energy demands?

Enter the insulating air barrier concept from BASF Polyurethane Foam Enterprises LLC – a closed-cell, spray-applied polyurethane foam that surrounds the home's building envelope, or shell, in a single, blanket of air-tight insulation from the foundations, up the walls and across the roof.

Why an air barrier system?

While many people believe that simply adding insulation is the best way to make a home more energy efficient, most traditional insulation products do nothing to stop uncontrolled air leakage. And uncontrolled air leakage has been proven to be the biggest energy vampire in almost any home. The U.S. Department of Energy (DOE) reports that up to 40 percent of the energy cost of heating and cooling a building is wasted by uncontrolled air leakage. In cold weather, heated, moist air inside the home escapes through cracks, gaps and holes in the building envelope to join the colder, dryer outside air, causing your furnace to work harder to maintain indoor comfort. In warm weather, hot, humid air enters the home through those same pathways, increasing the burden on the air conditioning system.

Uncontrolled air leakage contributes to premature building deterioration, condensation, spalling, ice damming, poor indoor air quality (IAQ) and mold growth. Most homeowners notice the problem through accompanying comfort issues such as chilly drafts, cold floors, or excessively dry or damp conditions.

Building science experts agree that an effective air barrier system is the best way to substantially reduce both air leakage and the passage of moisture through the building envelope.

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For every code and climate

BASF Polyurethane Foam Enterprises LLC provides insulating air barrier systems that eliminate costly uncontrolled air leakage by providing a seamless, self-adhering, air-tight building envelope system. The spray-applied technology is engineered on the molecular level to suit its specific purpose, and is unique in the way it allows design professionals and building owners to specify a material that is completely tailored to meet and exceed required performance criteria for every code and climate.

Using the versatility of polyurethane chemistry to combine a superior effective insulation R-value (over 6.0 per inch[1]) with almost-zero air permeability, the insulating air barrier systems increase building energy efficiency, durability and occupant comfort, health and safety.

These formulations – COMFORT FOAM® for single-family residences and WALLTITE® for multi-unit residences (as well as industrial, commercial, institutional buildings), along with insulating air sealants installed in critical hard-to-build areas to provide complete air barrier continuity – offer a closed-cell content of greater than 90 percent and meet ASTM 1029/SPFA guidelines when applied at only 1.5-inch thickness. Open-cell foams used for insulation have approximately 60 percent open-cell content and have far greater air and vapor transmission characteristics. As such, open-cell products only qualify as air barriers as defined in *ASTM International E 2178, Standard Test Method for Air Permeance of Building Materials* when applied at maximum thickness – 5.5 inches. Although open-cell foams tend to be slightly less expensive per pound than closed-cell formulations, this cost advantage is often lost due to the need to apply over three times as much material when using an open-cell foam as an air barrier.

Typical applications for BASF Polyurethane Foam Enterprises spray-applied polyurethane foam materials in low-rise and high-rise residential building envelope systems include:

- **Wood framing**
- **Metal framing**
- **Foundations**
- **Slab on grade**
- **Walls**
- **Floors**
- **Crawl spaces**
- **Attics**
- **Garages**
- **Cathedral ceilings**
- **Rim/band joists**
- **Bonus rooms**

Lower energy, installation and lifecycle costs

Because insulating air barrier systems combine superior insulation with total air leakage control, they allow HVAC requirements to be reduced at the design phase. Lower installation labor costs and a lifecycle that lasts throughout the structure's life expectancy combine to make the insulating air barrier system one of the most cost-effective solutions available today[2].

A residential study by Advanced Certifed Thermography shows that COMFORT FOAM installations can help reduce energy costs by as much as 60 percent each year compared to traditional insulation systems. Over 20 years, this can mean as much as $15,000 in savings at today's energy costs. With escalating energy costs, realized savings may be even greater.

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The BASF Polyurethane Foam Enterprises systems can also contribute to obtaining energy-efficiency incentives under the Federal Energy Policy Act of 2005. Under the Act, builders of site-built or manufactured homes are eligible for a rebate of $2,000 for energy-efficiency measures that achieve 50 percent savings over the 2004 IECC Standard.

Existing homes can also benefit from using BASF Polyurethane Foam Enterprises insulating air barrier and air seal materials under the Energy Policy Act. Envelope improvements to existing homes that meet the 2003 IECC and supplements are eligible for a rebate equal to 10 percent of the cost of improvements, up to $500.

The DOE offers financial assistance opportunities through the Office of Energy Efficiency and Renewable Energy (EERE) and other incentives are available through over 60 ENERGY STAR® incentive programs. In addition, special mortgages for energy-efficient homes are offered by more than 40 different agencies across the United States.

BASF Polyurethane Foam Enterprises LLC is associated with the ENERGY STAR Insulation Program and an Ally in the ENERGY STAR Homes Builder Program. This program offers Energy Efficiency Mortgaging (EEM) that may help borrowers to qualify for additional mortgage dollars.

Criteria	COMFORT FOAM®	Glass Fiber	Wool	Blown Cellulose	Open-Cell Foam
R-value per inch[3]	6.0	3.0	3.5	3.0	3.5
Approved Air Barrier System	Yes Air leakage <0.001 L/s/m² @ 75 Pa at 1.5" thickness	No	No	No	Yes Air leakage 0.005 L/s/m² @ 75 Pa at 5.5" thickness
Seamless Construction	Yes	No	No	No	Yes
Rigid	Yes	No	No	No	No
Fully Adhered	Yes	No	No	No	Yes
Adds Structural Strength	Yes	No	No	No	No
Long Service Life	Yes	No	No	No	Yes
Absorbs Water	<4% v/v	Yes	Yes	Yes	>40% v/v
Allows Moisture Vapor In	No	Yes	Yes	Yes	Yes

What about durability?

Because the BASF Polyurethane Foam Enterprises air barrier materials are seamless and fully adhered, they actually add structural strength[4] and will not settle or sag over time, unlike traditional insulation systems.

Testing conducted by the National Association of Home Builders (NAHB) Research Center shows spray-applied polyurethane foam insulation between wood- and steel-stud wall panels increased rack and shear two to three times over standard stick-built components and glass fiber insulation when sprayed onto gypsum wallboard or vinyl siding, and increased racking strength by 50 percent when sprayed onto oriented strandboard (OSB).

Results from testing conducted by the National Research Council (NRC) of the Canadian Construction Materials Centre (CCMC) show spray-applied polyurethane foam air barriers offering long-term durability greater than or equal to the building's expected life span. They also show that 16-inch centered studs incorporating closed-cell polyurethane foam may be moved out to 48 inches and still maintain racking and structural loads according to Code.

Health, safety and environmental responsibility

COMFORT FOAM and WALLTITE insulating air barrier systems use ZONE3® zero ozone depleting blowing agent technology, contain no urea formaldehyde and emit no volatile organic compounds (VOCs). The award-winning BASF Eco-Efficiency Analysis assesses total cost and ecological impact over the product lifecycle to benchmark current performance and get insight for future improvements. The WALLTITE insulating air barrier system outperformed traditional air barrier materials in eco-efficiency on its test scores.

The COMFORT FOAM system is accepted by all major building codes, including the International Code Council encompassing both commercial and residential applications. Accredited third-party testing of the COMFORT FOAM system using *ASTM E283-(04)* proves that COMFORT FOAM insulation is a Building Code-recognized air barrier material.

The WALLTITE insulating air barrier system for multi-unit residential, industrial, commercial and institutional buildings is approved by the Air Barrier Association of America (ABAA) to meet or exceed all current State Commercial Energy Codes, and is installed only by approved applicators with third-party quality control inspection.

As demand for sustainable construction materials and energy-efficiency applications continues to grow, BASF Polyurethane Foam Enterprises offers new cost-effective solutions, developed at extensive R&D facilities around the world.

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[1] R means resistance to heat flow. The higher the R-value, the greater the insulating power.
[2] Savings vary. Find out why in the seller's fact sheet on R-values. Higher R-values mean greater insulating power.
[3] ASHRAE 2005 Handbook, Chapter 25, Table 4—Thermal Properties
[4] National Association of Home Builders (NAHB)

This fact Sheet complies with the Federal Trade Commission labeling and advertising of home insulation rules and regulations, Federal Register, 16 CFR Part 460 Labeling and Advertising of Home Insulation: Trade Regulation Rule; Final Rule, Tuesday, May 31, 2005.