



## STYROFOAM Insulation Saves Energy in Ways Plywood, OSB, and Fiberboard Cannot

STYROFOAM\* brand insulation in frame wall sheathing applications

STYROFOAM\* brand insulating sheathing saves energy:

- By increasing the overall insulation value of the wall.
- By blocking heat flow through the wood framing.
- By reducing air infiltration into the home.
- By reducing convective looping in the wall cavities.

### Ohio State University Research

In-depth research<sup>1</sup> on full-scale 2 story houses conducted by Ohio State University concluded that a home sheathed with STYROFOAM brand insulation produced several unexpected energy savings over a home sheathed with wood fiberboard. Many builders have not yet recognized that these extra energy savings are provided by STYROFOAM brand insulation. Here are some quotations from the Ohio

State University's Final Report, available on request:

"This illustrates that STYROFOAM brand sheathing provided benefits far beyond what the added thermal resistance can achieve."

"The majority (of benefits) came from air infiltration rate reduction, air convection within the stud cavity, and so on."

"(A system using) STYROFOAM sheathing has been demonstrated to be tighter than the regular fiberboard sheathing system."

"Because of the warmer temperature in the stud cavity, the convective air movement is reduced."

"Therefore, the significance of a STYROFOAM brand sheathing system should not be measured

merely by the advantage of thermal conductance. It does indeed reduce the total heat loss through other heat transfer mechanisms, and there is no simple way to quantize such multiple effects other than real life and field test, like the one described here."

- **STYROFOAM BRAND INSULATING SHEATHING DOES MORE THAN ADD R-VALUE.**

### Higher R-Value

Comparing sheathing R-values, STYROFOAM brand insulating sheathing has a higher R-value than conventional sheathings – five times higher, in fact, than an equal thickness of OSB. And the higher the R-value of an insulation, the better the insulating ability and the lower the heat transfer. Most importantly, STYROFOAM brand insulating sheathing insulates the framing and blocks this weakest thermal link in the wall. Plywood-sheathed walls typically lose over 40% of their heat loss directly through the

<sup>1</sup>The research report is entitled "Energy Usage Comparisons of Identical, Non-Inhabited Residential Homes with Two Types of Insulation and a Program Simulation of the Required Heating Loads." It was conducted by Ohio State University's Dept. of Mechanical Engineering Environmental Control Group.



framing. STYROFOAM brand insulating sheathing corrects this high framing loss.

- R-5 1" STYROFOAM Brand Insulating Sheathing
- R-4 3/4" STYROFOAM Brand Insulating Sheathing
- R-3 1/2" STYROFOAM Brand Insulating Sheathing
- R-1.3 Fiberboard
- R-0.55 Plywood
- R-0.55 OSB

## • REDUCED AIR INFILTRATION

### Ohio State Study Measures a 30% Reduction in Air Infiltration

Air infiltration is the largest single heat loss in most houses. The Ohio State University study measured the air infiltration of two identical homes in Columbus, Ohio. The one with STYROFOAM brand insulation recorded 30% less air infiltration than the home with fiberboard.

### STYROFOAM Brand Insulation is Flexible, Wood Sheathings Are Not

The reason STYROFOAM brand insulation is so successful at reducing air filtration is due to its flexible and resilient nature, which allows it to accommodate high and low spots in the framework resulting from misalignment,

warpage, or knots. When nailed to the plates and studs, STYROFOAM brand insulation acts like a gasket, thereby significantly reducing air infiltration. Plywood, OSB and wood fiberboard sheathings are too rigid to conform to the irregularities in the wood framing.

## • LESS CONVECTIVE LOOPING

### Convective Looping Reduces the Thermal Efficiency of Fiberglass Batts

This is a smaller benefit than those just discussed, but it's important. Air within the wall cavity rises when it contacts the warm drywall, and then falls when it contacts the cold exterior sheathing. This phenomenon is called convective looping and carries heat flow around the cavity insulation. Convective looping becomes more severe with large temperature differences between the drywall and the sheathing. And this is exactly what happens with exterior sheathings such as plywood, OSB, and wood fiberboard, because these sheathings have very little R-value and therefore remain cold. The Ohio State study showed that STYROFOAM brand insulation warmed the wall cavity. Thus, it reduced the amount of convective looping.

## • THE BOTTOM LINE:

### STYROFOAM brand insulation Saves Money

**Estimated Energy Savings was \$100 per Year** based on the foam's higher R-value, the Ohio State researchers estimated that the home sheathed with 1" STYROFOAM brand insulation would save around \$100 per year based on an energy cost of \$0.06 per kWh.

### Actual Energy Saving Was \$260 per Year

Surprisingly, the amount of energy actually saved by the home with STYROFOAM brand insulation was around \$260, when the test period was projected for the entire heating season. That's over 2.5 times the savings that the researchers had expected.

### Why the Difference?

Based on these measured results, the researchers at Ohio State concluded: **"This illustrates that STYROFOAM brand sheathing provided benefits far beyond what the added thermal resistance can achieve. In this case, less than 40% of the total energy saved is from thermal conductance. The majority came from air infiltration rate reduction, air convection within the stud cavity, and so on."**

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