

# Is insulation sexy or just itchy?

## Improve comfort, efficiency of new or existing homes

The president told us recently that “insulation is sexy.” As someone who gets paid to crawl around and through obscure insulated areas in homes, I feel like I may be missing some of this new insulation glamour. Sexy or not – properly installed insulation is a critical factor in keeping you cozy at home and reducing utility costs.

### What’s the best type of insulation?

I get this question all the time. According to industry-standardized testing, most types of commonly used residential insulation material have very similar thermal properties.

Insulation is rated in terms of thermal resistance, called R-value. R-value indicates the resistance to heat-flow through a material. The higher the R-value, the greater the insulating effectiveness. The R-value of thermal insulation depends on the type of material, thickness and density.

The R-value (per inch) for fiberglass batts, blown fiberglass, blown or wet spray applied cellulose, cotton batts, open cell spray foam and rigid Styrofoam are not significantly different. More exotic (and expensive) insulating materials, such as rigid poly-isocyanurate and closed-cell spray foam, have nearly double the R-value per inch of more common materials.

The key to effective insulation performance is not necessarily the type used, but that there is some and that it is installed correctly. Las Cruces has several existing homes built prior to the '70s with either poorly installed insulation or simply no insulation at all.

Rising energy prices have led to increased insulation use in the outer building shell of modern homes. Until recently there has been very little focus on correct insulation installation to ensure that it can perform as rated when installed in the building envelope.

### Insulation airhead

My wife and my high school driving instructor have both accused me of being an “airhead.” When it comes to effective insulation, that can be a good thing. Air has excellent R-value as long as it is not moving. The better a material can encapsulate and hold air molecules in place, the better we can prevent energy transfer or heat loss or gain through the home envelope.

The most effective insulation installations include air barriers that keep air stabilized in place. Spray foam or rigid insulation materials are great because the surface is an air barrier and each capsule or “cell” within the material holds immobilized pockets of air.

When air moves through a material, it carries thermal energy with it. If more porous types of insulation, such as fiberglass or cellulose, are installed with no barrier to limit air flow, we just get a filter. This situation is typical of batt insulation installed in attic walls.

Our framed house walls usually box in insulation within the wall on all six sides. When batt insulation is installed at walls adjacent to an attic space, the attic side of the insulation is usually left exposed. Since the surface of the batt insulation has no air barrier, air moves freely through the insulating material and much of the thermal R-value is lost.

Any opening or gap in an insulated wall system that allows air movement greatly reduces the effective R-value. For example, a typical 2-by-6 wood frame wall with an R-19 rated fiberglass batt may provide an effective (total wall system) R-value of 13 or even less. The reduced performance is not due to the fiberglass batt being an inferior material; it simply was not installed to fill the wall cavity and allows air to move freely through and around the insulation.

### Stand guard at the energy bridge

A thermal bridge is a place in your house wall, floor or ceiling where insulation is bypassed. These “thermal bypass” areas are numerous and include areas with no insulation such as metal or wood lumber framing, concrete slabs, windows, heating and cooling registers, window frames, skylights, utility penetrations or similar areas where heat energy can be easily conducted. The most effective wall, ceiling and floor assemblies include a continuous layer of insulation also known as a “thermal break”.

A continuous layer of rigid insulation installed at the inside or outside of a cinderblock, metal or wood framed wall provides a thermal break. It doesn't matter how good the R-value of the insulation is between the studs in a wall, if you can still move energy through the concrete, wood or metal materials from the interior to the exterior (or vice versa, depending on the season), a thermal bypass will decrease the thermal barrier performance of the wall system.

Advanced wall systems such as insulated concrete forms and blocks (ICFs), structural insulated panels (SIPs) and offset double frame walls all use thermal breaks to maximize home envelope insulation effectiveness.

Comparisons of these advanced types of wall systems to standard frame walls can be confusing since the rated R-value of the insulation material used may be higher in the standard wall. A 6-inch SIP wall panel may have an insulation



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R-value of only 19 while a traditional 2-by-6 wood frame wall may have R-22 rated blown fiberglass cocoon insulation. The combined thermal properties of the SIP wall system will be better (due to the thermal break inherent to the design) than the frame wall assembly because there are fewer thermal bridges (SIP = R-19, and 2-by-6 with blown fiberglass = R-15, for the entire wall as a system including framed areas).

### Cheap and effective

Insulation installed correctly is one of the least expensive and most effective ways to improve the comfort and efficiency of a new or existing home.

EPA's Energy Star “Thermal Bypass Checklist” provides best practice installation guidance for insulation in new home construction. In your existing home, be sure to work with a licensed insulation contractor or HERS rater that can do a whole house thermal performance analysis (e.g.: ResCheck or RemRate) prior to installation. This type of analysis takes away the guesswork on which type of installation will work best for your specific project.

Federal, state and utility provider tax credits and or incentives are available for most insulation projects – be sure to check with your contractor, supply store, utility provider or Home Energy Rater.

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