



## **ENERGY SERIES: What about Insulation?**

Insulation is rated in terms of thermal resistance, called R-value, which indicates the resistance to heat flow. Although insulation can slow heat flow—conduction, convection and radiation—its greatest impact is on conduction.

Higher R-values corresponds to greater insulation effectiveness. The R-value of thermal insulation depends on the type of material, the thickness and density. When calculating the R-value of a multi-layered installation, the R-values of the individual layers are added.

The effectiveness of an insulated wall or ceiling also depends on how and where the insulation is installed. For example, compressed insulation will not give its full rated R-value. Also, the overall R-value of a wall or ceiling will be somewhat different from the R-value of the insulation itself because some heat flows around the insulation through the studs and joists (thermal bridging). With careful design and proper installation, this short-circuiting can be reduced.

The key to an effective insulation system is proper installation of quality insulation products. A building should have a continuous layer of insulation around the entire building envelope—with no gaps or compression. Studies show that improper installation can cut performance by 30% or more.

### **What if the Home Still Feels Too Warm or Too Cold Even With Attic Insulation?**

If your attic has ample insulation and your home still feels too warm in the summer and cold in the winter, chances are you need to add insulation to

the exterior walls as well. Before considering this option, check the ductwork and heating, ventilation and air conditioning (HVAC) equipment to determine if the problem is HVAC-related.

### **How Can I Determine How Much Wall Insulation is in the Home?**

Determining the level of wall insulation in an existing home is difficult. One way is to turn off the electricity, once you have permission (if needed) and all safety considerations have been met. Using a screwdriver, remove the cover on some of the electrical outlets (or phone jacks) located on exterior walls. Using a flashlight, a small mirror, and a ruler, determine the type and thickness of the insulation by peering in and looking along the sides of the electrical/phone box. (Don't forget to turn the electricity back on when you're finished.) If you don't feel comfortable "looking around," have someone else do this for you.

### **What Other Insulation Factors Should I Consider?**

Properly insulating your home will not only help reduce your heating and cooling costs but also make your home more comfortable. Visit the U.S. Department of Energy's web site:

<http://energy.gov/public-services/homes/home-weatherization/insulation> for information on how insulation works, adding insulation to an existing house, selecting insulation in new home construction, where to insulate, types of insulation, and how to make the insulation in your home more effective.

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