

LIVING GREEN NEWS

Volume 4, Number 11
November 2011

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Insulation

Unless you live where you never have to use heat or air conditioning, insulation needs to be an important part of your home. It keeps your house cool in summer and warm in winter. It reduces noise levels even as it reduces energy bills.

According to the Solar Energy Industries Association, homes insulated properly use half the energy of those without insulation. Lining your “thermal envelope” - adding materials that don’t readily allow heat to leak through your walls, ceilings, floors, from around your home’s foundations and its ductwork - saves energy by keeping heat in during the winter and keeping heat out during the summer.

Insulation is an integral part of the overall design of your home. Your insulation choices depend on the choices you’ve made in other construction materials. Steel studs, for example, conduct heat much more readily than do wood studs.

The effectiveness of a piece of insulation is measured by its R-value. The R-value in insulation designates its resistance to heat flow. An R-value is a measure of how much time it takes 1 Btu of energy to pass through a given material, which is important. But it is also critical to think about insulation’s ability to prevent air and moisture

infiltration. Generally speaking the higher the R-value, the greater the insulating ability - the more effective it is.

When evaluating an insulation product, it is important to look at more than just the R-value ratings as R-values do not account for the affects of air movement. For example, polyurethane foam provides much higher performance than its actual R-value when properly installed.

Adding insulation to an un-insulated attic could be the most cost-effective, energy-saving measure you can do. Many older houses were built with little or no insulation. In more moderate climates, the minimum recommended R-value is R-30 for an attic, R-11 for walls, R-19 for raised floors, and R-4.2 for ductwork. However, you need to check with your town or city to determine what their recommendations/requirements are. Many have a guide that can be downloaded from their website.

Type of Insulation:

Fiberglass - R-value – 3.5 per inch: Conventional installation of fiberglass doesn’t yield the performance required for a zero energy house. Typically, fiberglass is stuffed into wall cavities without regard for wiring, plumbing, or other obstacles already installed. Fiberglass requires conscientious air sealing before installation:

- All vertical and horizontal penetrations from the envelope need to be foamed to prevent air movement
- Attic/second floor connection requires perfect air sealing because fiberglass itself does very little to resist air movement
- Batts must be cut around every wire, electrical box, and pipe in the wall

Cotton Batts – R-value – 3.5 per inch: Cotton batts are made from recycled materials. To work effectively, they require perfect installation around all obstacles in a wall cavity. The material is very difficult to cut: use an electric knife and a manual hedge trimmer for straight cuts.

Cellulose – R-value – 3.5 per inch: Cellulose insulation has a high recycled content and is more affordable than foam. Make sure to use only borate-treated cellulose, as any moisture that gets into ammonium sulfate-treated cellulose will cause it to off-gas ammonia.



Note: It is recommended that you use a professional to install cellulose.

Cellulose can be installed two ways:

1. Dry as loose fill in wall and is kept in place behind netting. But be careful. Too dense, it fills out the netting and makes drywall difficult, if not impossible to install.
2. Sprayed on. It is mixed with an acrylic binder that holds it firmly in the wall cavity. It can be sprayed in as deep a wall cavity as necessary and stays stable. It has the advantage that it fills around wiring, plumbing, and other obstacles.

Spray Polyurethane Foam:

Spray foam tends to be the insulation of choice for zero energy home builders. It has superior air-sealing properties, fills around pipes and wires in the walls for a perfect seal.

There are two forms of spray polyurethane foam:

Closed-cell Foam – R-value – 6 per inch: This is more water-resistant than open-cell foam. It is actually a commercial roofing product with a permeability of less than 1. It has structural properties that increase the strength of a wall by 30% and improves the connection between walls and roofs four times over toe-nailed trusses.

It is a great product for high-wind load areas or for tornado- or hurricane-prone zones. Closed-cell foam should be sprayed only 2 in. to 3 in. per pass rather than all at once because of the heat it creates as it sets.

Note: For cost-savings, you may consider using one pass of closed-cell foam for air sealing and then fill the rest of the cavity with cellulose or fiberglass.

Open-cell Foam – R-value – 3.5 per inch: It has a density of 1/2 lb. per cubic foot. It expands rapidly - up to 100 times its initial volume when applied - but as it is expanded with water, there is no off-gassing. It is vapor permeable, which means it dries faster, but unlike closed-cell foam it is not water resistant. While is about the same as fiberglass or cellulose, its advantage over fiberglass or cellulose is that it still performs as a great air barrier. Open-cell foam is priced considerably lower than closed cell and can be sprayed to fill the entire wall cavity.

Note: The above numbers are estimates and the final R-value depends on density and installation.

Interior Vs Exterior Insulation:

What are the advantage and disadvantage of interior and exterior insulation?

Interior Insulation

Advantages

- It is simpler to install on existing foundation walls.
- Material costs may be low since you can use almost any insulation material.

Disadvantages

- Many types of insulation require separation from habitable spaces by a fire-resistant material, since they are often extremely flammable and will release toxic gases if ignited.
- It reduces usable interior space when retrofitted.
- It fails to protect the waterproofing membrane.
- It may become saturated by moisture.

Exterior Insulation

Advantages

- It minimizes heat loss through the foundation.
- It protects waterproofing membrane.
- It can serve as a capillary break to block moisture infiltration.
- It prevents freeze-thaw cycle damage to foundation.
- It reduces interior moisture.
- It does not reduce usable interior space when retrofitted.

Disadvantages

- Installation is more difficult than interior insulation in retrofits.
- Material cost is higher.
- Some exterior insulation materials are susceptible to insect infestation.

The net of all of this – **You need to do your homework!**

Check with your County, City or Town for recommendations/requirements. Do you want to go **GREEN**? Research the products available and their manufacturers. Talk with several companies and Home Centers that sell these products. Look into the Federal and/or State tax credits that may be available. Talk to your energy provider. They may have low interest loans or even grants to help cover the cost.