Home Repair Resource center

HOMEOWNER REPAIR GUIDE

INSULATION STRATEGIES

To reduce heating costs

There are many products that can be used to weatherize and insulate your house. The main objective when insulating is to create a heat-retaining envelope, one that will contain and put to best use the heat produced by the home's heating unit. To achieve this, you'll need to use different materials, each in an appropriate location. Let's talk about some different approaches and look at where they work best.

AIR CONTROL

Let's start with air control. Air is constantly moving around us. In winter, the colder outside air enters the home, and the heated inside air naturally rises. These are the two forms of air movement that you need to pay the most attention to controlling:

Infiltration	Leakage of cold air from the outside into the house
Exfiltration	Loss of heated air from the house to the outside

STOPPING COLD AIR FROM GETTING IN

External colder air infiltrates the house any way it can. It moves through cracks around doors or windows, through gaps where the wood walls of the house connect to the masonry foundation, and through other spaces, such as around outside water faucets. It will also radiate from cold window glass. To correct air leakage, you need to close or seal the gaps. Around doors or windows, use one of the many available types of weatherstripping. For gaps between wood and masonry, or around door or window frames, caulking is the solution. (See separate handout on "Caulking and Weatherization" for hints on how to choose and install the right materials for each situation.) To block cold radiating from glass, add storm windows, insulating glass, or even plastic "shrink wrap" barriers to create a pocket of trapped air to act as insulation.

KEEPING HEATED AIR WHERE YOU WANT IT

The warmer air that you've paid to heat is also moving inside the house. It rises up to and through the roof. To a lesser extent, it also moves out through the side walls and windows. The first step in controlling this movement is to make sure the heated air gets to where you want to use it. If you have a forced air furnace, the warm air moves through a system of pipes, called "ducts." They can and do leak, allowing warm air to escape where you won't use it, such as in the basement. Prevent this air loss by sealing all ducts that pass through unheated spaces with duct mastic and insulating them with R6 vinyl-backed insulation wrap. If you have a register on your furnace plenum, close it.

HEATING THE BASEMENT

Most often, the heat that radiates from the furnace and ducts is more than enough to warm a basement. If a heat source is needed in the basement, install a duct (at least 16” long) and then add a register. This will maintain proper static pressure in the plenum and ensure proper heat distribution to the rest of the house.

If the heat source in your home is a boiler, it is relatively easy to insulate the water pipes that carry heat from the boiler to the rest of your house.

Once you've made sure the heat is getting to where you want it, keep that warm air where it belongs by following the caulking procedures already outlined. In addition, close doors and turn off the heat in unused rooms. Go into the attic and seal around anything that passes from the heated floors below into the attic (such as the chimney, water or soil pipes, or wires.) All these holes allow the rising warm air to move out of the house. Only when you've done all these steps are you ready to look at house insulation.

INSULATING THE HOUSE

There are several types of insulation, but all are designed to contain heat within your house.

IF YOUR ATTIC IS…	YOUR BEST STRATEGY
Finished	Add insulation behind the ceiling and knee walls. Insulating in this way will allow the heat from the other floors to pass through to warm the attic, but keep it from being lost through the roof.
Unfinished (used primarily for storage)	Insulate the attic floor. This will retain the heat in the house below it and leave the attic cold. (If you later decide to use that attic as living space, it’s relatively simple to add a supplemental heating source for that area.)

In either case, the goal should be to insulate the living space of the house, while allowing the roof to remain the same temperature as the outside.

HOW INSULATION WORKS

Insulation works on the same principles that a storm window does. It traps air, and the trapped air provides an insulating barrier. That is why thicker insulation has more resistance (or “R value,” a measurement of the ability of a material to resist the flow of heat through it.) When you stuff or compress insulation, you reduce its R-value, because you reduce the amount of air it can trap. (For help in choosing the best form of insulation to use or where to install it, see the separate insulation handouts in our Resource Library.)

The same thing happens if the insulation gets damp or wet from moisture in the house. As it mats down, its R-value decreases. This is the reason that adequate ventilation in an attic is so important. Attic vents allow air movement, which carries away moisture and thus maintains the insulation at its peak effectiveness.

PUTTING IT ALL TOGETHER

Just as trees, bushes, walkways, and exterior lighting all add to the total effectiveness of your landscaping plan, the various forms of insulation and weatherization work together in your house to keep the cold out and warmth in. When you add to these energy conservation methods some lifestyle changes, such as setting your daytime thermostat lower and lowering it even further at night, moving beds to inside walls, hanging heavier curtains, and closing off unused rooms, the savings will translate into money in your pocket, and comfort in your home.

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Home Repair Resource Center empowers homeowners to maintain their homes for sustainable and diverse communities.

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