The basics of insulating your home

FACT SHEET

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To Midwesterners used to severe winters, it comes as no surprise that heating systems are the number one consumers of energy in the home. To keep energy costs under control it helps to understand the basics of sealing and insulating your home. These are two important measures that help maintain uniform indoor temperatures all year long and reduce energy consumption.

Regardless of which season it is, even the slightest gaps around windows or doors can make it difficult to control your home's temperature, causing your heating (and air conditioning) system to work for longer periods of time. This wastes energy and costs you more money. That's where sealing your home can help.

Insulation, on the other hand, saves energy by slowing heat transfer. Heat has a tendency to travel toward cooler areas. In winter, for instance, heat will move toward an attic or unheated attached garage. The process also works in reverse. During the hot summer months, hot air trapped inside an attic can warm the cooler air in the rooms below. Insulation slows the movement of heat and helps to keep heat where you want it—inside in the winter and outside in the summer.

CAUTION

Before doing any air sealing or insulation work, it's critical to take respiratory precautions and to be aware of the structures within which you are working. Be especially mindful of electrical wiring and possible fire hazards. If you are not comfortable doing this type of work, we strongly recommend hiring a professional.

AIR SEALING

Keeping cold air from entering your home involves two tasks—sealing hidden building cavities and closing narrow spaces around windows and doors. Sealing hidden building cavities usually requires a professional blower door test to find the places that need sealing. A blower door is a panel-mounted fan that fits into an exterior doorframe. The fan pulls air out of the house, lowering the indoor air pressure and allowing outside air to leak in. Leaks often show up around plumbing penetrations, chimney chases, recessed light fixtures and dropped soffits (where kitchen cabinets are attached to the ceiling).

Installing blow-in insulation.

Finding and fixing hidden leaks can be a difficult task and is best done before insulation is installed or upgraded. We recommend that you contact a Home Performance with ENERGY STAR® specialist for help.

INSULATION

Insulation is material that is installed in your home's attic, walls and other "cavity" areas in order to prevent or slow the transfer of heat from one area to another (see diagram on page three). It comes in a variety of material types; each is rated by an "R-value," a measure of thermal resistance. The higher the R-value, the greater the insulating power. Insulating a home is a fairly permanent measure since it's generally applied only once. Let's first take a look at the different types of insulation and where they are used.

Types of Insulation

Insulation is made from several different materials, including fiberglass, recycled newspapers (cellulose), urethane foams and recycled cotton fibers. Insulation also comes in a variety of forms for specific applications.

Loose-fill

Loose-fill insulation was developed to easily fill the open cavities of walls and attics. This type of insulation comes in bags of fibers or granules and is usually blown into place with special equipment. Depending on the

application, loose-fill insulation may be treated with water or adhesives to assist in covering irregularly shaped or hard-to-reach spaces.

Batts and blankets

Typically made of fiberglass, this type of insulation is either packaged in blanket rolls or pre-cut into batts, both of which fit the cavities between ceiling, wall or floor framing boards. This form of insulation is very flexible and, depending on its R-value, can be quite thick. Each is available with or without a vapor barrier lining. A vapor barrier helps prevent moisture from building up inside the wall cavities.

Rigid sheets

Rigid insulation is made from fibrous materials or plastic foams that are shaped into board-like sheets. They are generally used in new construction, especially on outer walls underneath the siding and on building foundations, and provide a relatively high R-value per inch of thickness. For fire safety reasons, this type of insulation must be covered with finishing materials.

Sprayed or extruded foam

This form of insulation requires special equipment, which either sprays or extrudes (forces) foam into the wall, floor or attic cavities. In addition to slowing the passage of heat, this type of insulation also seals spaces from air infiltration.

Insulating the sill box with spray-in foam.

Where to Insulate

Let's take a look now at the places within your home where insulation may be applied and consider the R-value needed (see table). In general, you should insulate open cavities of all walls, floors and ceilings adjacent to your home's living spaces.

RECOMMENDED INSULATION LEVELS FOR HOMES

AREA	R-VALUE
Attic	R-38*
Walls	
Above-grade	R-19
Below-grade	R-10
Floors	
Slab on grade	R-10
Floor over unconditioned space (e.g., garage)	R-21
Exterior foundation	R-5

***R-50 FOR ELECTRICALLY HEATED HOMES**

Attic

In attics, insulation is blown in, rolled or placed (using blankets or batts) between the joist boards above your ceiling. The attic should have a minimum of 12 inches of loose-fill or fiberglass batt insulation. If your attic already has insulation that rises to the top of the joists, additional blankets or batts can be added perpendicular to the joists or additional insulation can be blown in as required.

Walls

Be sure your above-grade walls are insulated. Insulating these cavities can have a major impact on heating bills and comfort. Existing walls can be insulated by blowing or spraying insulation through small holes drilled into the wall cavities underneath the siding.

Floors and basement

Floors or walls that are located above or next to unheated spaces, such as crawl spaces, can also be insulated. Converting an unheated basement into a heated, insulated living space can help eliminate heat loss from ductwork and reduce the risk of freezing water pipes. In addition, a properly dehumidified, insulated basement can decrease condensation, which can help prevent mold or mildew.

Foundation

The top of foundation walls, where the foundation wall meets the upper part of the house sill box, can also be insulated. It's best to caulk any cracks first in order to prevent air leakage. This is a good application for spray-foam insulation, although fiberglass batts with an inward facing vapor barrier can also be used.

Also, insulating a slab floor or foundation can help prevent heat loss, primarily along the edges where the walls meet the floor. Other areas that can be insulated include exposed heating ducts and water pipes.

WINDOWS: WEATHERSTRIP OR REPLACE?

Probably the easiest way to tell if your windows need caulking or weatherstripping is to first visually inspect them and then touch them (especially during cold, windy weather). If you feel outside air coming inside, apply caulk. (You may need to add storm windows as well.) However, a draft near a window may not be due to leakage, but to the cold glass setting up an air circulation near the window (see diagram). A blower door test can help determine if your windows are leaking.

Cold windows are not efficient windows; if they're getting old, consider replacing them with ENERGY STAR qualified units. Windows that are badly cracked or that have very large gaps where they meet the house frame should be replaced as well.

Inspect doors, too. Check the way doors close and look for gaps. One of the easiest ways to inspect for gaps is to look for light around the door's edges when it is closed. Check the weatherstripping that runs along the bottom edge of the door. If badly cracked, it may need replacing. Don't forget to check your garage door if you have an attached garage.

FOR MORE INFORMATION

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Contact Focus to learn more about smart energy choices.

Home Performance with ENERGY STAR

Mechanical systems interact with the air tightness and insulation of your home, every change made affects the entire house. Home Performance with ENERGY STAR consultants show the homeowners exactly how their home is performing. Recommended improvements help maximize the comfort, health and safety of your home, and minimize building maintenance and utility costs. To identify energy saving opporunities, or for more information, call 800.762.7077.

state.mn.us/pages/Energy/InfoCenter/EnergyGuides.htm

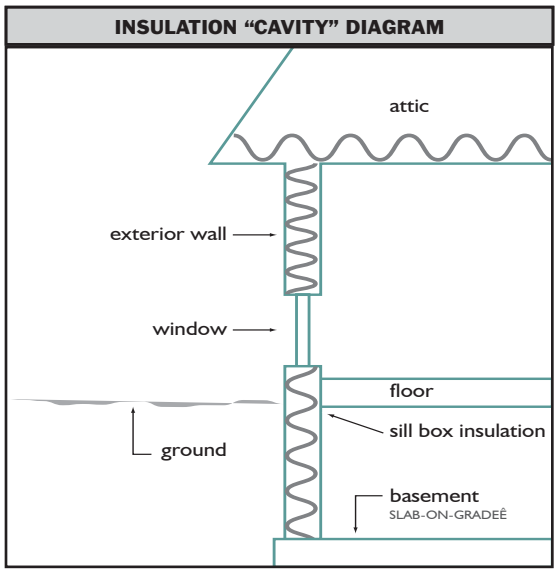
"Home Energy Guide: Techniques, Tactics and Tips," from the Minnesota Department of Commerce, Energy Information Center. This series includes a guide on home insulation.

www.eere.energy.gov/buildings/info/homes/insulatinghome.html

Insulation fact sheets published by the Energy and Renewable Energy Network, focuses on selecting and applying insulation.

http://homeenergy.org/archive/hem.dis.anl.gov/eehem/95/951111.html

"Air Sealing in Occupied Homes," an article published by Home Energy, explains air sealing in existing homes.



Insulation is essential to low heating and cooling bills. The most important places to insulate (in order of priority) are the attic, walls, floors above unheated spaces, sill box and the basement. The sill box is the space where the floor joists meet the foundation wall.

LIZBETH KUGLITSCH

Stick frame house during construction. Later, wall and ceiling cavities will be sealed and insulated.

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