



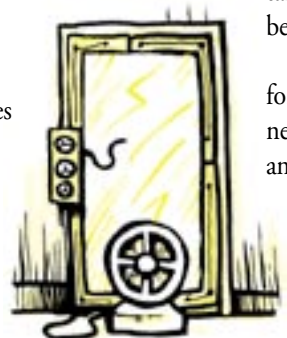
**HOME ENERGY COSTS ARE NOT LOWERED BY INSULATION ALONE. SEALING IS IMPORTANT TOO!**

To keep heating costs down during cold Montana winters, it helps to seal cracks and unwanted openings in your

house to prevent **air infiltration**—unwanted drafts that displace precious heat. Warm air will naturally move to a cooler space. So if your house is not well sealed, your heat—and your heating costs—will escape to the cold outdoors. As the warm air escapes, cold outside air is also pulled in through cracks around the foundation and near doors, windows and other openings to replace the lost heated air.

Since warm air also rises, cracks and openings in the ceiling are of major concern. This air movement pattern is called the **stack effect**. Poorly sealed houses act like giant chimneys, and the greater the temperature difference between outside and inside, the faster your heat moves up and out. Winter winds also speed the process.

You can stop this great heat escape by sealing up your house. Before you begin, though, be sure to first correct any moisture or indoor air quality problems in your house, because air-sealing could make them worse. It's also very important to make sure all combustion appliances such as furnaces and water heaters are working right and are properly vented. Read the Power Bill brochures on condensation control, indoor air quality, gas appliances, and carbon monoxide for more information.



**A BLOWER DOOR TEST CAN REVEAL WHETHER YOUR HOME HAS AIR LEAKS AND HOW TIGHT YOUR HOUSE IS.**

**Blower Door Tests**

If you're eligible for weatherization assistance, you may be able to arrange to have your house air-sealed and insulated. The work will likely start with a blower door test to help find the air leaks and determine the tightness of your house. The blower door is primarily a large fan that pulls air out of your house. As it draws air out, a technician can accurately measure air tightness and locate air leaks.

You can conduct your own air leak test on a windy day using your hand. Dampen your hand and hold it around closed windows, doors and other suspect places. A slight leak will make your hand feel very cool.

**Caulk, Foam and Weather-stripping: basic air-sealing materials**

How efficiently you are able to seal air leaks depends on the size and location of the openings and in choosing the right material for the job. You can plug larger holes with pieces of drywall or cardboard. Or, stuff the holes with plastic bags filled with glass fiber insulation scraps. For most openings, caulking, sealants and weatherstripping are the most common solution.

**Caulk** is a semi-solid, toothpaste-like substance you apply into gaps of up to 3/8-inch where different building materials meet, such as along a wall and the foundation. Hardware and building supply stores carry many varieties of caulk. Most often, caulking comes in tubes either applied by using a caulking gun or squeezed by hand. Caulk is also available in card or rope form, applied with your fingers. For sealing cracks and holes in a climate like Montana, select a quality product that seals well in temperatures below 0°F and in the heat of summer.

Ask a store salesperson for help in choosing the right caulk for the job and carefully follow the product directions. You'll need different types of caulk for different surfaces on the inside and outside of your house. Some caulk is waterproof, some not; some can be painted, some not. Higher-end caulk seals better, lasts longer, and isn't much more expensive than the bargain varieties. With caulking, you get what you pay for. Air-sealing is one area in which you don't want to scrimp on materials, because a poorly sealed crack is still a crack!

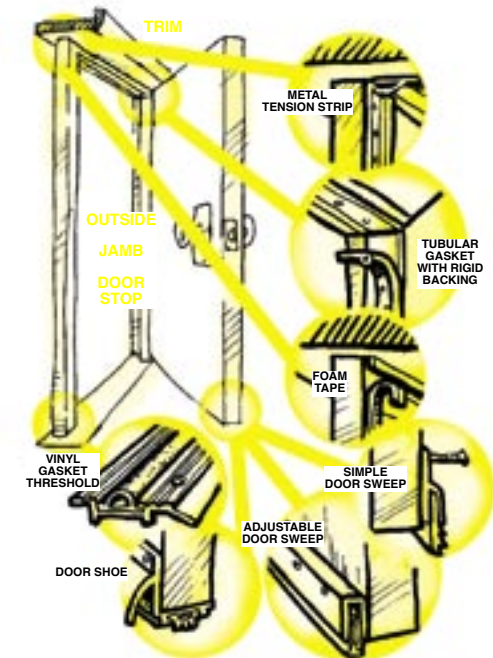
**Foam sealants** are commonly used to fill larger gaps of up to one inch. Once applied, they expand to fill and seal the space and, like caulk, they harden as they dry. The two most common types are urethane and latex foam, both of which are available in cans at hardware and building supply stores. Latex foam cleans up easier and often comes with a reusable applicator so you don't have to finish a whole can at once. Urethane foam can be difficult to remove from hands and clothes, and most applicators are not reusable.

**Weatherstripping** eliminates gaps between movable parts when they are closed—around the perimeters of exterior doors and operable windows, for example. Replaced weatherstripping can be made of metal, foam, rubber, vinyl or felt and is often sold by the foot, or in pre-packaged window/door kits. If possible, always try to match the product that originally came with the door or windows—the finished result will look its best and likely be the most effective. Again, ask a store salesperson for help in selecting the right product for your job. Some materials are nailed or tacked on; others are applied with self adhesive tape. Well-installed weatherstripping will be slightly compressed when doors and windows are closed.

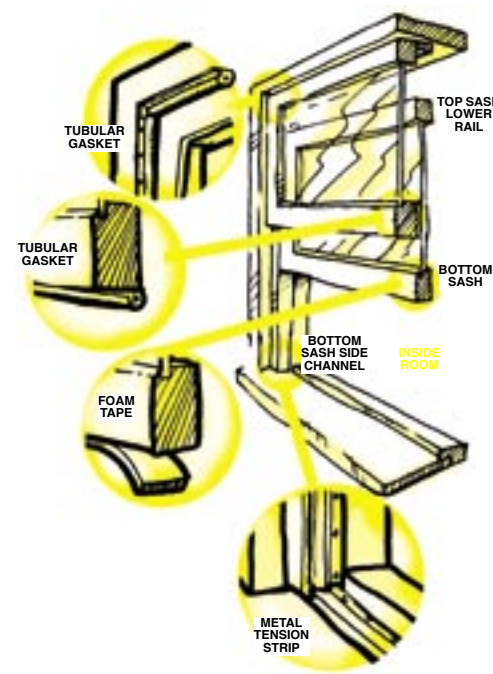
**Start at the Top!**

Start by closing gaps between your roof or attic and the living space below. Attention to this area will save the most on your heating bill. Every opening in the attic floor is a potential heat escape route. Check around electrical wires, light fixtures, chimneys, stove flues, ductwork and plumbing vent pipes. Also check along the tops of walls. To walk around up there, lay boards on top of the joists, because the ceiling won't support your weight. Wear a dust mask and don gloves if you have to roll insulation back to look for leaks. Dirty spots on your insulation will generally indicate a gap. In some old homes, partition walls from below open into the attic space. These large openings are best sealed by stuffing plastic bags filled with glass fiber insulation.

Chimneys and stove flues require special attention. Be sure to use heat-resistant caulk for small gaps and add a sheet metal collar to seal larger openings. Treat the attic hatch as an outside door and apply weatherstripping around it.



**Weatherstripping options for doors**



**Weatherstripping options for windows**

### **Examine, Seal and Insulate Ductwork**

If you have a forced air heating system, it pays to seek out leaks in both the supply and return ducts in attics or crawl spaces. Make sure all the pieces are properly connected, with the furnace fan operating, run your hand over the duct seams/joints to feel for air leaks. Holes in supply ducts will blow air out, and gaps in return ducts will suck air in (tissue will stick to the hole). Plug any leaks you find with foil duct tape (not duct tape), or better yet, use water-based mastic coupled with glass fiber mesh tape.

Once the leaks are fixed, you can save even more by insulating the ducts located in unheated areas with foil-faced glass fiber duct insulation. Just wrap the insulation around the duct and tie or tape it into place.

### **Tackle the Low Spots**

Now you're ready to seal up those places where cold air can get in—around window and door frames and between your living space and unheated basement or crawl space. You can use the same methods and materials as you did up in the attic: weatherstripping around doors and operable windows and plugging gaps with caulk, foam or drywall. Again, make sure to use heat-resistant products around chimneys and stove flues.

You can also buy inexpensive foam gaskets that fit behind electrical outlet and light switch cover plates. If you have a fireplace, be sure the damper is closed when you're not using it, and seal it up tighter if you don't use it much.

Be careful down in the basement or crawl space because it is possible to do *too much* tightening around your home's foundation. All combustion appliances, such as gas furnaces, water heaters and ranges, need fresh air to operate properly, and cutting off that air supply could cause carbon monoxide and other dangerous gases to build up inside. Contact a heating contractor, your utility company or local Human Resources Development Council (HRDC) for assistance in determining just how tight to seal.

### **Air-Sealing Brings Many Benefits**

No matter who does the work, you or a contractor, the time and money spent on air-sealing will provide many returns, especially when coupled with attic, wall and floor insulation. Read the four Power Bill insulation brochures for more information on that step. Making your home energy-efficient will not only lower your heating bills, but also keep your home cooler in the summer and cleaner because less dust will blow in. Now that's an added bonus anyone can appreciate!

### **For More Information**

For more information about energy-saving tips, contact your local utility, the Human Resources Development Council, the tribal weatherization office or the MSU Extension office in your county.

**For the HRDC or tribal weatherization office nearest you, call 1-800-332-2272.**



2,000 copies of this public document were published at an estimated cost of 30¢ per copy, for a total of \$600.

The U.S. Department of Agriculture (USDA), Montana State University and the Montana State University Extension Service prohibit discrimination in all of their programs and activities on the basis of race, color, national origin, gender, religion, age, disability, political beliefs, sexual orientation, and marital and family status. Issued in furtherance of cooperative extension work in agriculture and home economics, acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture, Douglas L. Steele, Vice Provost and Director, Extension Service, Montana State University, Bozeman, MT 59717.

Printed on Recycled Paper. July 2005 GM



# **AIR SEALING**

## **KEEP HEAT WHERE IT BELONGS**

