

home WEATHERIZATION



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Homeowner's Guide to Weatherization

This guide offers simple, practical techniques to weatherize your home that will save you money on utility bills, reduce energy consumption, and keep you comfortable all year long.



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Why is Weatherization Important?

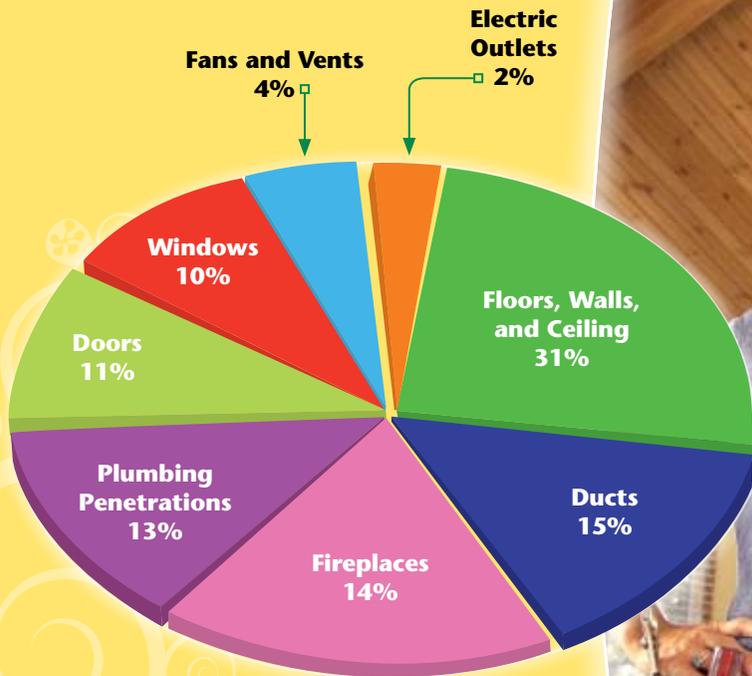
Uncontrolled and undesirable air movement – leaks and drafts – through cracks around windows, doors, outlets, vents, and other openings on outside walls can cause your home’s cooling and heating system to work harder than necessary, waste energy and raise your utility bills unnecessarily.

The two most important terms for understanding the value of weatherizing your home are **Air Gain** and **Air Loss**. Air Gain is the movement of air from the outside to the inside of your home. Conversely, Air Loss is the movement of air from the inside to the outside of your home.

Good insulation is not enough protection from the elements. Even a home with excellent ceiling and wall insulation can suffer from year-round Air Loss and Gain. In the summer, cool air inside can escape (leak) to the outside. In the winter, cool air may seep into your home, displacing the comfortable warm air your heating system worked hard to supply.

Location and amount of air loss or gain in your home depends on several factors: your home’s age, placement on the lot, construction type, insulation installed, duct losses, and the outside environment. You may be paying much more on your utility bills and wasting energy resources due to uncontrolled Air Loss or Gain.

Typical Distribution of Air Leakage at Home



Data Source: Energy Savers Booklet,
U.S. Department of Energy (2008)



Where Does Air Loss and Air Gain Occur?

There are typically two categories of air loss or gains in your home: direct and indirect.

Direct air leaks are caused when air can pass directly through your home's walls, floors or ceilings.

Indirect air leaks refer to areas in your home that are not connected to an outside wall. This might include interior partitions, walls, stairwells, attic entries, holes drilled for electrical wiring or outlets, or under your sink where pipes enter an interior wall.

As your home ages, its weight can cause the foundation to shift and settle. Doors and windows, once airtight, may begin to leak. Ceilings and walls may develop cracks and corners or joints may pull apart. Air leaks can occur through cracks in stucco, bricks, mortar, or siding. Even your chimney and fireplace can pull away from the walls or roof.

Other common sources of air leaks include: improperly installed or adjusted doors; broken windows; holes in exterior walls; aged, weathered or termite-infested wood; large cracks in stucco or foundation; and missing bricks or mortar.



Common Sources of Air Leaks

1. Dropped ceilings
2. Recessed lights
3. Attic entrances
4. Sill plates
5. Water and furnace flues
6. All ducts
7. Door frames
8. Chimney flashing
9. Window frames
10. Electrical outlets and switches
11. Plumbing and utility access



Data Source: Energy Savers Booklet,
U.S. Department of Energy (2008)



Inspecting Your Home for Air Leaks

Take a careful look around your home—inside and outside—for any signs of settling. Be sure to check all corners for leaks, especially where a moving part comes in contact with a non-moving part. Remember, the most common leaks are found around doors and windows.

Testing for Air Leaks Around Doors and Windows

Test 1: Shut a door or window on a piece of paper. Try to pull the paper out. If it releases without tearing, there is a good chance your home is losing energy.

Test 2: After dark, send someone outside to shine a flashlight around the edges of doors and other sources of potential cracks. Watch for rays of light. If you see light, you do not have an air-tight seal and may be losing energy. This test does not work well for small cracks.

Test 3: This test works best on cold or windy days. Stand on the inside of your door. Moisten your hand and pass it around the edges of the door. Repeat this for every door and window. Wherever you feel a draft, air can pass in and out of your home.





Caulking

Caulking, a “sealing compound,” is an excellent way to seal cracks, small openings, or joints less than a-quarter-inch wide. Caulking can be used to seal air leaks throughout your home, including around windows and door frames.

There are several types of caulking materials and choosing the right one for your job is very important. Manufacturers’ products vary in strength, properties, and prices, so please follow the directions for selection and application of each product you consider.

Oil-Based & Resin-Based Caulks

A low-performance caulk that lasts about 1-4 years and bonds well to most surfaces.

Water-Based Foam Sealant

- Does not produce greenhouse gases or over expand to bend windows. Not for use on larger gaps. Must be exposed to air to dry and takes 24 hours to cure.

Latex Caulks

Lasts from 2-10 years and is excellent for light-duty work. Bonds to most surfaces, but should not be used to seal concrete or metal surfaces. Needs to be painted when used on exteriors.

Butyl Caulks

Designed to last 10 or more years. Are the most difficult to apply, but will adhere to almost any building material.

Polysulfide, Polyurethane and Silicone Caulks

The most flexible, extremely durable and bond easily to most surfaces. These caulks work well around joints that receive mild shock or movement, such as doors or windows.

Where to Caulk

Before applying caulk, be sure to detect all air leaks and assess your ventilation needs for indoor air quality. Read and follow the instructions on the compound cartridge. Here are some common places to caulk:

- Between window and door frames and exterior siding, stucco, etc.
- Under doors and window sills where wooden structures meet the foundation
- Where storm windows meet the window frame (do not fill drain holes at the window sill)
- Around exterior openings: pipes, water faucets, electrical wiring, and conduit
- Where pipes and wires penetrate the ceiling below an unheated attic
- Where a wall meets an eave at gable ends in a heated attic
- Around skylights and roof vents
- At corners formed by siding
- Between porch, deck or balcony and the main house

Helpful Tips:

- Clean all areas before applying caulk
- Read and follow manufacturers' instructions for proper use, application and safety
- Avoid stops and starts. Caulk in one continuous stream
- Make sure caulk sticks to both sides of opening
- Use a putty knife to push any excess caulk back into the crack



Insulating Switch and Outlet Plates

Air loss or gain can happen in unlikely places. You may be surprised to learn that heat loss in your home can occur through electrical outlets and light switch plates. Fire-retardant insulating foam gaskets are an inexpensive fix. You can purchase pre-cut gaskets at most hardware and home improvement stores.

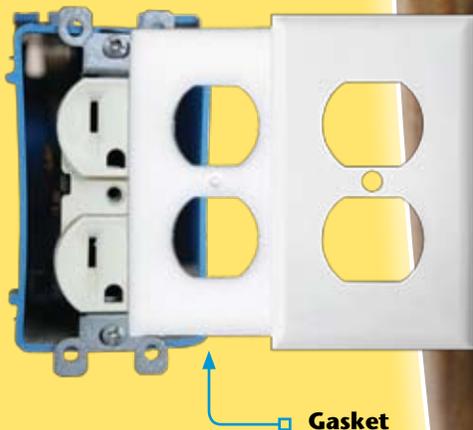
Use gaskets on outlets and switch plates that are on walls adjacent to the exterior of your home. If your home is older, weatherization experts recommend using gaskets on interior walls as well. Child-proofing plugs are recommended for unused or infrequently used outlets.



Gasket Installation Tips

- Count the number of outlets and light switches inside your home along the perimeter walls before purchasing
- Read and follow manufacturers' instructions for proper use, application and safety
- Work on one room or area at a time

Caution: Do not install foam insulating gaskets if your home has aluminum wiring due to the risk of fire.



Gasket





Weatherstripping

Weatherstripping is an excellent way to solve air leakage problems. You can purchase pre-packaged units. Buy weatherstripping by the foot or select from special weatherstripping kits.

Types of Weatherstripping

Adhesive-Backed Foam

Extremely easy to install and ideal for non-moving window frames.

Spring Metal

Made of thin spring metal, and works well for double-hung windows and some doors.

V-Shaped Adhesive-Backed Foam

These V-shaped strips are similar to spring metal weatherstripping in that they are easy to install.

Door and Threshold Sweep

If your door does not have a threshold, a sweep is an excellent weatherization option. The sweep installs at the bottom of a door and seals any gaps. They are durable and made with a combination of materials such as metal, aluminum or plastic, with a rubber or soft plastic edge.

Door Threshold

A vinyl bulb threshold is useful if you do not have a threshold or if the wooden gasket on your threshold has worn out. Note that most wooden threshold gaskets can be adjusted up or down with the turn of a screwdriver. Check on this possibility before investing in a new gasket or threshold kit.

Door Shoe Assembly

This is located on the underside of your door and has a floating gasket seal that fits into a metal bracket. It is designed to make contact with your door's threshold gasket. Installing a new door shoe or gasket seal may eliminate air leaks. If you decide to install a new shoe assembly, the bottom of your door may need to be cut to accommodate the new size.







Weatherstripping Tips

- Locate the air leaks you want to seal with weatherstripping
- Determine the type of weatherstripping you need
- Use a tape measure to estimate the amount of material you need
- Buy 10-15% more weatherstripping than your measurements indicate, just in case
- Gather your tools: tape measure, screwdriver, hammer and nails, heavy-duty staple gun, heavy-duty shears or utility knife, and tin snips
- Follow manufacturer's installation instructions carefully
- Allow plenty of time and always work safely

Home Insulation Overview

Insulation is found inside your walls and above your ceiling and is your primary defense against air loss or gain. It's a permanent way to reduce energy use and make your home comfortable. Insulation is typically installed during a home's construction. Adding insulation after your house is completed can be very difficult and expensive.

If your home is relatively new, your insulation probably meets specific building codes. If your home was built before 1980, or if your energy bills are excessively high or you are uncomfortably cold in the winter or too hot in the summer, chances are that your home may require additional insulation. Visit www.eere.energy.gov for recommended R-values for your state.

You can check for insulation by removing an outlet or switch plate located on a wall adjacent to the exterior of your home. Take a peek inside. You can also inspect your attic, ceilings, exterior and basement walls, floors, and crawl spaces. If you discover your home is not insulated properly, start your weatherization process by caulking, using gaskets and sealing windows and doors first. See how much of a difference these adjustments make before you make a major investment in adding wall and ceiling insulation.



Be aware that a certain amount of fresh air is needed for good indoor air quality. There are specifications that set the minimum amount of fresh air needed for a house. If you are concerned about how tight your home is, hire a qualified contractor, such as a Home Energy Rater, who will measure the actual leakage in your home. If the results show your home is too tight, a fresh air ventilation system may be recommended.





Types of Insulation

R-value refers to the insulation's resistance to heat flow or thermal transfer. The higher the R-value, the lower the rate of heat flow and the greater the insulation value for your home. Typically, R-values range from R-11 to R-60.

Depending on where you live in the country and the age and type of construction, it is very likely your home was built using one or more of these types of insulation:

Batts and Blanket Insulation – Usually made of fiberglass, rock wool, cellulose or vermiculite and available in rolls or long pieces. Commonly used in hard-to-fit places with irregular joist spacing.

Loose-Fill Insulation – Also known as “Blown-in-Blanket,” this insulation can be added to an existing home's un-insulated walls or attic by a contractor. A special machine mixes cellulose insulation and forces it through a hose, while an operator blows the insulation inside your walls. Glue is added as the insulation exits the hose to keep the insulation from sinking to the bottom of the wall cavity.

Rigid Board or Rigid Foam Insulation

Urethane, polystyrene, fiberglass, and polyisocyanurate are typical types of rigid board/rigid foam insulation used to insulate walls. It is typically more expensive than the fiber insulation, but it is effective in buildings with space limitations and when higher R-values are required.

Foam-in-Place Insulation

This insulation can be blown into walls to reduce air leakage or into cracks around windows and door frames.

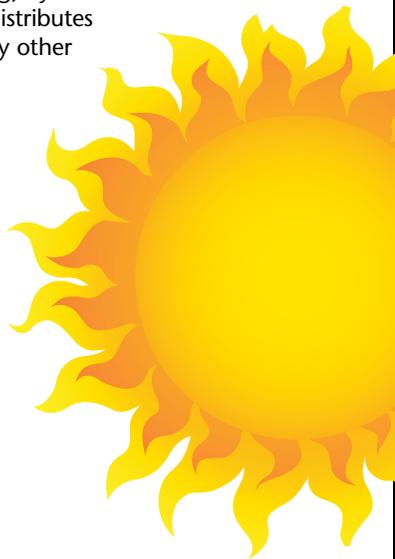
Duct Insulation

Your home's HVAC (Heating, Ventilation and Air Conditioning) system is designed with an intricate network of ducts that efficiently distributes air inside your home. Exposed ducts in your attic, garage or any other unconditioned space should be insulated.

Attic Ventilation

Extreme heat can easily build up in an attic or crawl space that is not properly ventilated. This cancels out some of the benefits of insulation and substantially increases heat gain. Improper attic ventilation also promotes moisture build-up.

Homes are usually built with adequate vents positioned to release excess heat. Inspect your attic or crawl space to make sure nothing is blocking side or top vents. An unventilated attic could reach a temperature of 160°F and above!



How Your Windows Work

Learning how energy flows through windows will help you understand how heating and cooling costs are affected by the type of windows you have. Here are three important terms to know:

Sunlight or Solar Radiation

An important source of heat that is transmitted directly through windows.

Radiant Heat

Is transferred from warmer objects to colder objects. Things warmed by sunlight are stronger sources of radiant heat. Radiant heat is blocked by glazing found on most windows.

Conduction

Conduction is the process of heat transfer from one substance to another by direct contact. Heat transfers from the warmer to the cooler side of a window. Conduction happens through solid materials (window glass and frame), and also through the air space between the two layers of glass (dual pane window).



Insulating Windows

All windows are assigned a U-value which is based on the amount of heat transmitted through the window. The lower the U-value, the less heat is transmitted. Your windows are more energy efficient if they have a low U-value. For example, $U=0.54$ is more efficient than $U=0.87$.

There are several ways you can limit sunlight and heat from entering your home, greatly increasing your windows' performance and your comfort.

Consider these alternatives:

Solar Screens

Especially popular in the hot Southwest, solar screens are custom fit to each window and are extremely effective for blocking heat.

Shading

Shading with trees, shrubs, vines, and trellises is one of the most effective ways of blocking sunlight and heat from entering your home (walls facing south, east and west). Shading allows you to stop sunlight before it reaches the exterior of your home.



10 Easy Ways to Save on Your Utility Bills

1. **Adjust your thermostat manually or install a programmable thermostat and set it to follow your schedule.** Just a few degrees in temperature can make a big difference in the amount of energy you use. Set your thermostat to 65°F to 68°F in the winter and 78°F to 80°F in the summer, health permitting. You can save about 1% on your gas utility bill for each degree you lower the thermostat during the heating season.
2. **Change filters regularly.** Change your HVAC system air filters each month during high operating seasons and a minimum of four times per year. Dirty or clogged filters waste energy and make your system work harder than necessary. Regular maintenance on your HVAC is important, too.
3. **Keep window coverings closed in summer.** If shading is not possible, close your drapes, shutters or blinds to help prevent excessive heating inside your home.
4. **Let Mother Nature help.** Open your window coverings when it's cold outside and take advantage of the sun's warmth. Keep south-facing windows clean in the winter to let in the sun properly. Be sure to close window coverings before the sun goes down to keep the heat in.
5. **Look for cracks and gaps in walls, ceilings, around windows and doors.** Weatherstrip and caulk as needed. Check for insulation in walls and install outlet and switch plate insulating gaskets. Check all accessible air ducts for leaks and use mastic tape and caulk to seal leaks.

6. **When not needed, close off unused fireplaces and keep flue dampers in the closed position.** Turn off ventilating fans as soon as possible to avoid air loss, especially during heating months. Use a magnetized cover on the kitchen exhaust fan when it's not in use. Look for dirty spots on your insulation, paint, ceiling, and carpeting that might indicate an air leak.
7. **Dress for the weather.** If it's cold outside, dress in warm layers and wear light, loose-fitting clothes when it's hot. You'll save energy and be more comfortable.
8. **Use household appliances wisely.** Make sure you have a "full load" when using your dishwasher or washing machine. Try cool and cold water detergents, and if you have a smaller load, make sure to set the water level accordingly.
9. **Cooking tip.** Select stovetop burners that match your pan sizes. Don't use the oven if your toaster will do the job. Use your microwave when warming food or group several food items when using your oven.
10. **Turn it off.** Use appliances only when necessary. Turn the TV off if no one is watching. Turn lights off in unoccupied rooms. Use the moisture sensor control option on your dryer. This will eliminate over drying your clothes causing less wrinkling, and saves energy and money, too.





Natural Gas is the Natural Choice

Did you know natural gas is the cleanest burning fossil fuel? A common misconception for most people is that they believe electricity is “greener” since there are no emissions from the electric appliances used in the home. However, when you consider how electricity is generated and distributed to your home, the process of making electricity actually uses more fuel, like coal, natural gas and oil, and releases more carbon into the environment. Natural gas, delivered directly to your home for heating, water heating, cooking, and clothes drying, **is the most efficient and environmentally responsible use of this valuable resource.**

Because natural gas is a clean-burning, nationally abundant, and environmentally friendly fossil fuel, consumers who use natural gas directly for heating, water heating, cooking, and clothes drying play an important role in protecting our environment.

Weatherization Economics

The value of your improvements (or payback on your investment) depends on several factors, including what part of the country you live in, home size, and how much you pay for energy. Most of the techniques recommended in this guide will pay for themselves in five years or less, some in as little as one year. If you perform do-it-yourself energy improvements, they will pay for themselves very quickly because the outside labor cost is eliminated.



Weatherization Resources

For more information, call the Southwest Gas Energy Specialists at **1-800-654-2765** or visit us at www.swgas.com for a list of licensed contractors near you.

For information regarding the U.S. Department of Energy's Weatherization Assistance Program visit www.eere.energy.gov

You can easily conduct a do-it-yourself energy audit. Visit the U.S. Department of Energy's Energy Savers website at www.energysavers.gov for simple ways you can perform a home energy assessment.

If you prefer professional assistance with a home energy audit, call the Southwest Gas Energy Specialists at **1-800-654-2765** for a list of licensed energy auditors near you.



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