WINDOWS AND DOORS

Windows are a significant and important component of any home. They provide natural light, a view to the outside, ventilation, and solar heat gain in the winter. Windows also, unfortunately, can account for 10% to 30% of your heating bill and a significant portion of your cooling load. Three characteristics determine a window's energy efficiency:

• The first is U-value (U-factor) which controls heat loss in winter and, to a lesser degree, heat gain in summer. U-value is the inverse of R-value but the terms essentially describe the same thing: the heat loss and insulation value of a product. R-value is used for insulation in walls and attics, and the higher the R-value the better. U-value is used for windows. U-value is the inverse of R-value, so the lower the U-value the better. U-value is discussed in more detail in the Window Replacement section.

• The second is air leakage, which can cause significant energy waste year-round. Air leakage is especially important because drafts reduce indoor comfort in winter even if the temperature stays the same. Reducing drafts can allow energy-saving low thermostat settings without a decrease in comfort.

• The third is solar transmission, which controls unwanted solar heat gain in summer as well as useful "passive solar heating" during winter. Solar transmission is particularly important for windows exposed to many hours of direct sun.

This chapter describes how to improve all three characteristics of your existing windows to improve energy efficiency and also how to shop for energy-efficient new windows.

Exterior doors don't offer as much energy-saving opportunity as windows, mostly because of their relatively small total area. However, a very loose or badly weather-stripped door not only wastes energy, but causes uncomfortable drafts. Patio doors and single entry doors with windows can also pose significant energy performance issues. This chapter describes ways to improve your existing doors as well as how to shop for energy- efficient replacements.

Types Of Windows

Double-hung windows, with top and bottom sash that slide up and down, are by far the most common type of residential window. Single-hung windows look like double-hung, but only the bottom sash slides; the top sash is sealed in place. The sashes of some double-hung windows lift out of their tracks and tilt into the room for easy cleaning.

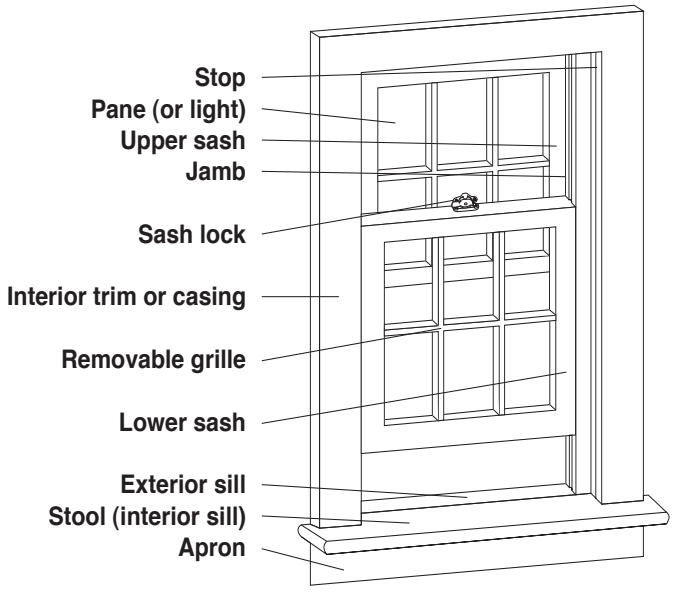


Figure 4-1 - Double-hung window

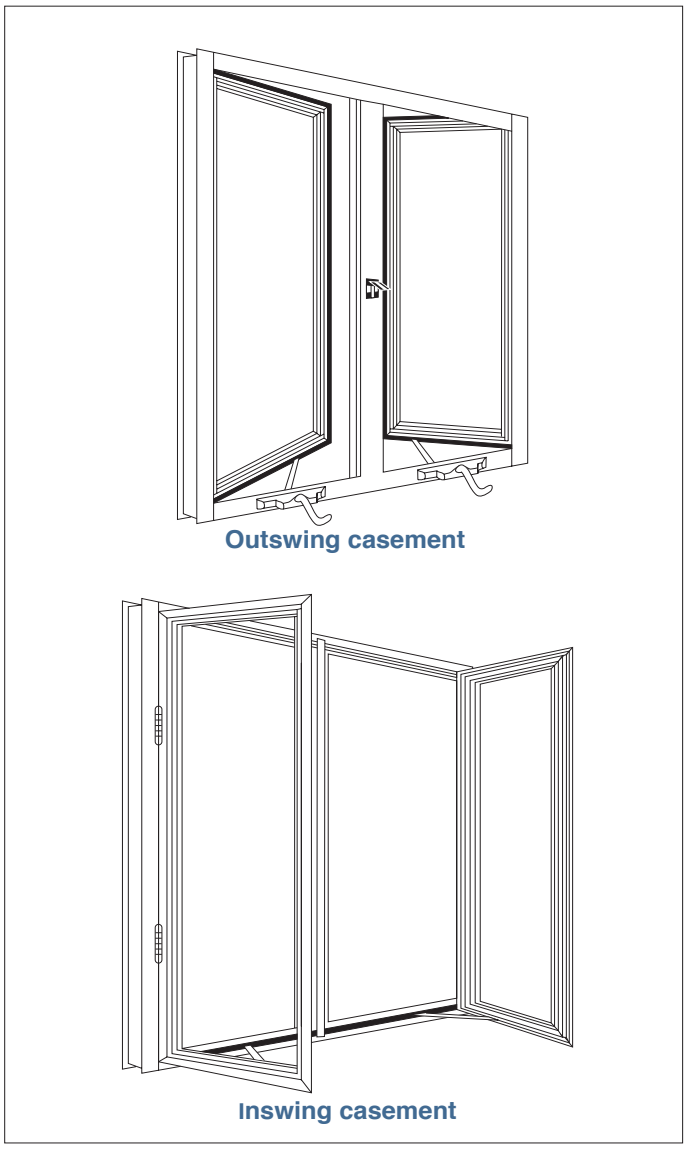
Old double-hung windows used sash weights to provide easier lifting. Those windows were typically quite leaky. New double-hung windows typically feature greatly improved weather stripping and springs that hold the sashes in place. These newer windows are nearly as airtight as the best casement windows.

Casement Windows

Casement windows hinge on the side and close with a compression seal, usually with crank controls. A few European-style casement windows have sophisticated tilt-turn hinge mechanisms which allows them to pivot either from the side or bottom.

Because of the compression seal, casement windows are typically tighter than double-hung or other sliding windows.

Figure 4-2 - Casement window



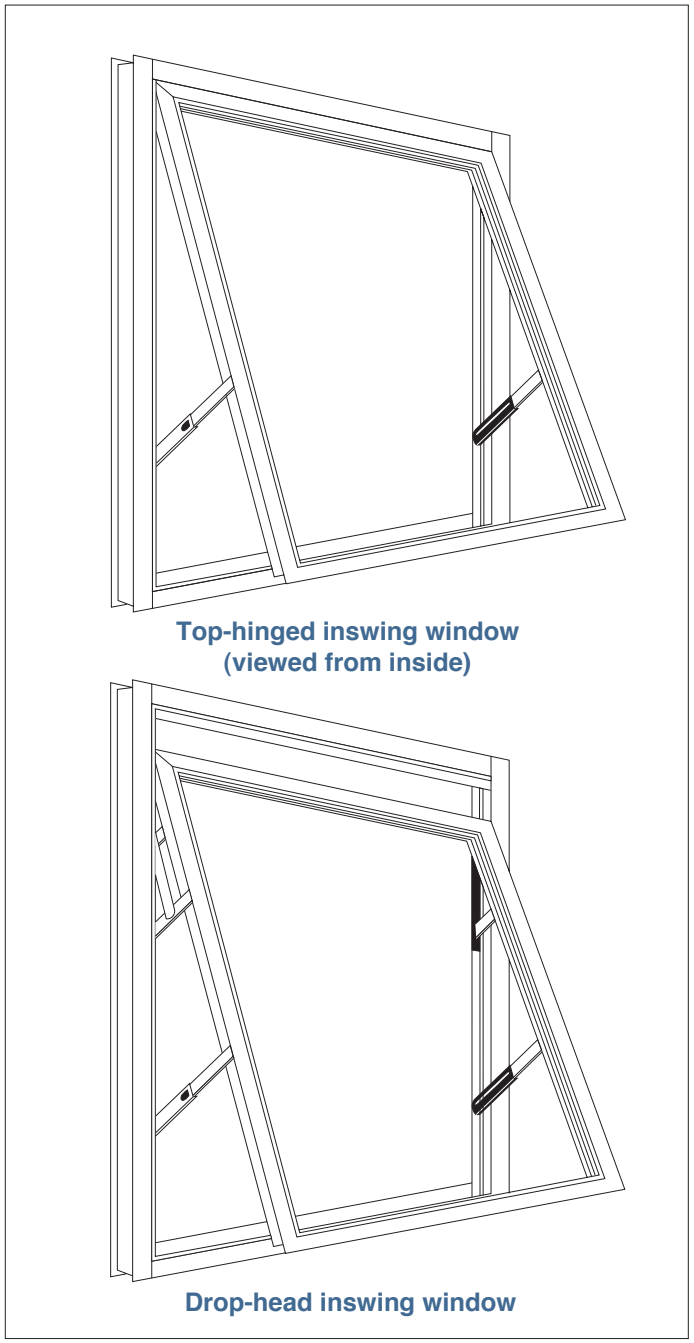
Awning and Hopper Windows

Awning windows hinge at the top and open outward. With some designs, the top of the window drops down to allow greater ventilation area. Like casement windows, these windows use compression weather stripping and are generally quite airtight.

Hopper windows, operate like awning windows, but are hinged at the bottom and pivot in; these are most commonly used in basements.

One good feature of these windows is they can be left open for ventilation and still keep rain from entering the house.

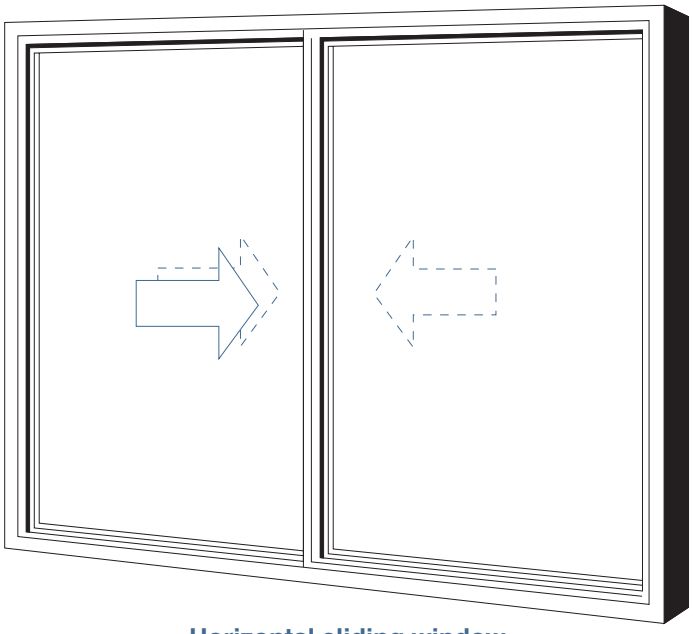
Figure 4-3 - Awning window



Horizontal Sliding Windows

Horizontal sliders are like double-hung windows, except that they slide horizontally rather than vertically. Like double-hung windows, these tend to be somewhat leakier than casements or awnings due to the sliding-type seal.

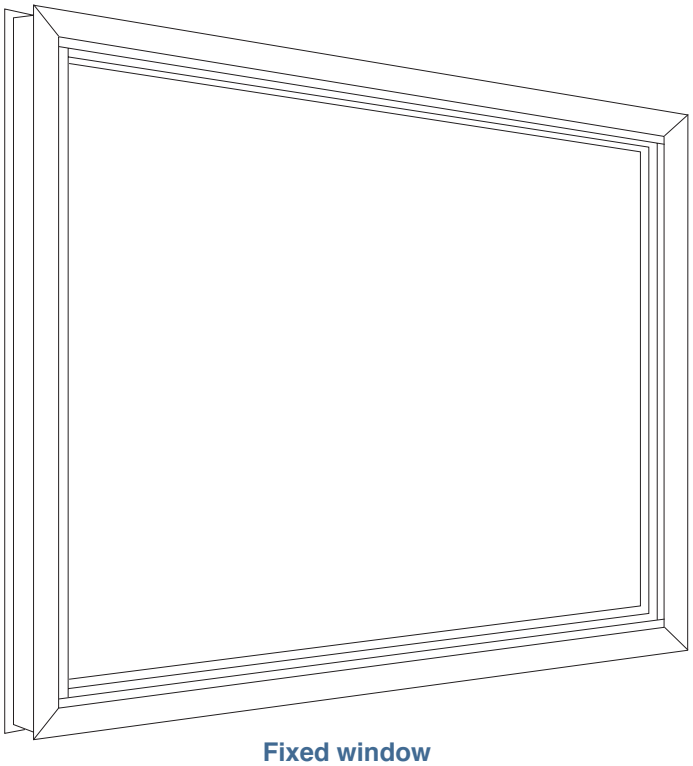
Figure 4-4 - Horizontal sliding window



Horizontal sliding window (viewed from outside)

Fixed Windows

Non-operable or fixed windows are available in unlimited shapes and sizes, including custom trapezoids and circles. They are often combined with operable windows for design variety.



Fixed window

Figure 4-5- Fixed window

Technically, fixed windows are the most energy-efficient since they allow little, if any, air leakage when properly installed.

Energy Efficient Windows

"Single-glazed" windows -- just one layer of glass in a wood, metal or vinyl frame -- have a U-value of 1.25. Although many older homes still have single-glazed windows, they are unacceptable with today's high energy prices. In the colder regions of Virginia, each square foot of single-glazed window loses the equivalent of one gallon of oil during the heating season.

Over the years, manufacturers have developed a number of technologies to boost window U-values. The first was old-fashioned wooden storm windows, extra panes of glass that had to be installed each fall and removed each spring. The next was permanently-installed aluminum storm windows, in which glass and screen sections could be slid up and down as the seasons changed. The most successful was “double-glazed” insulating glass, consisting of two panes of glass with a dead air space in between. Developed during the 1950’s, double-glazed sealed insulating glass units have a U-value of 0.49.

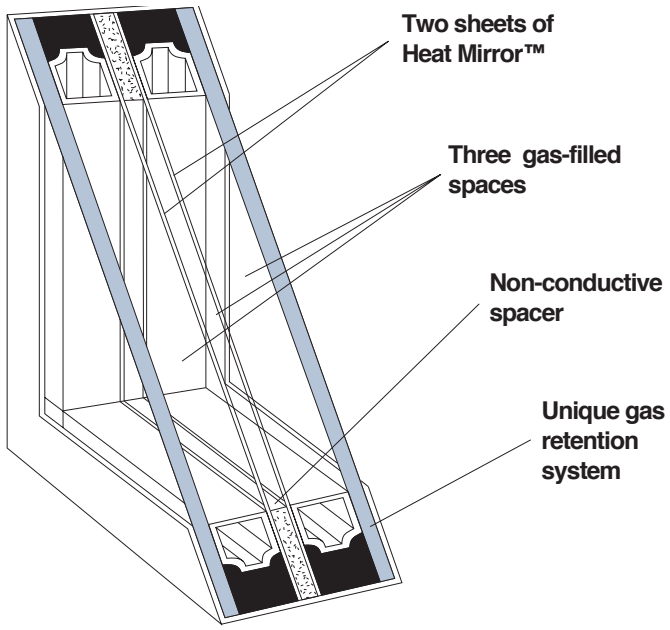


Figure 4-6 - Using a combintation of high-tech features, this glazing system for windows has a U-value of 0.22- almost as high as some insulated walls.

Further improvements have been made since the introduction of double-glazing. The most significant was the development of invisible "low-emissivity" coatings which, when applied to one glass surface, greatly reduce solar transmission while decreasing U-value slightly (to 0.48). First sold in 1980, low-emissivity or "low-E" glass is now used by every major window manufacturer and is also available in replacement glass. Additionally, most manufacturers increase the U-value of their double-glazed windows further by substituting special gases for air between the glass layers. These gases, such as argon and krypton, provide much better insulation than air. When used in a low-E window, they lower the U-value to 0.36.

During the late 1980's, manufacturers combined the technology of multiple glazing, low-E coatings and gas-filling to create "Super windows" with glass U-values as low as 0.11! Used mostly in colder northern climates, these windows can outperform a wall with R-19 insulation because of their ability to transmit useful solar heat in winter.

Reducing your windows' U-value

If your windows are only single-glazed -- just one layer of glass -- the U-value is only about 1.0 and should be reduced. There are two general ways to reduce the U-value of existing windows: add a storm window or add moveable insulation.

Storm windows

Storm windows, if properly installed, can reduce heat loss through single-glazed windows by lowering the U-value and reducing air leakage. Storm windows can be mounted either on the inside or outside of the existing window. The choice between interior and exterior storm windows is largely one of personal preference and cost. From an energy standpoint, they perform about the same but an interior storm window, if the existing window is still an effective weather barrier, can reduce condensation more effectively than an exterior storm window.

Tight-fitting old-style wooden storm windows perform slightly better than the modern aluminum-framed combination storm/screen storm windows. This is because aluminum is a poor thermal insulator. Your house may have old-style wooden storm windows, either in use or stored away in the attic or basement. If so, they can provide important energy savings. The problem with these old-style windows (and the reason they're never used in new construction) is that putting them up every fall and taking them down every spring is a lot of work, particularly on a multi-story house.

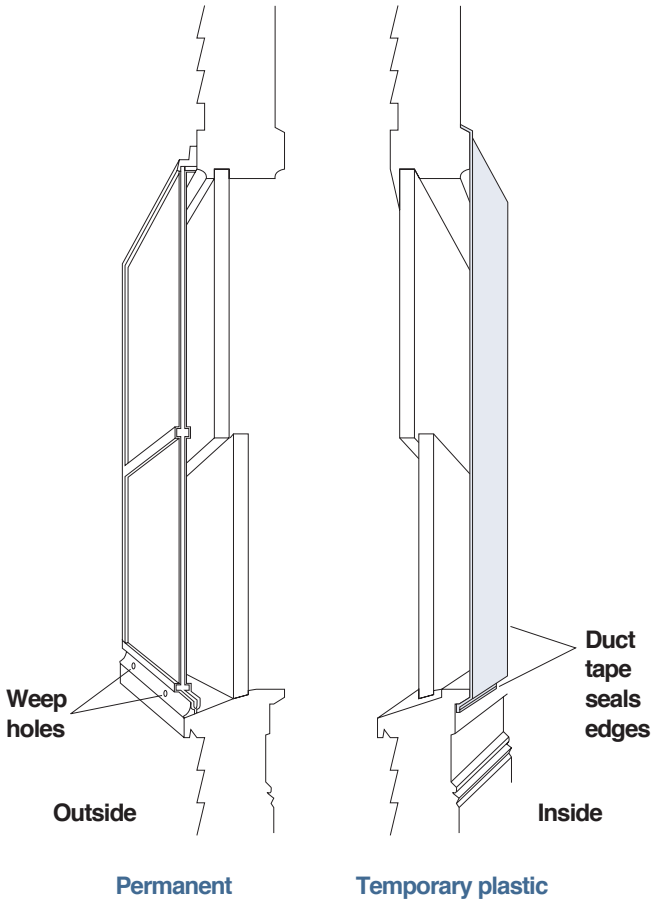


Figure 4-7- Storm windows can be an effective substitute for purchasing new windows if the existing window is still in good condition. Storm windows must be of good quality, installed properly, and have low-E glass.

When buying new storm windows, look for quality windows with low-E glass and good workmanship. Vinyl storm windows, with lower heat loss through the frame than aluminum, are now available. Be sure to properly install storm windows and seal them effectively where the storm window frame meets the existing window frame. Be careful not to seal the weep holes.

It is important to examine the cost-effectiveness of purchasing storm windows. Sometimes their lower cost relative to new energy efficient windows will not justify the reduced convenience, energy savings, and home

improvement value.

Interior storm windows, sometimes referred to as "energy panels," are generally easier to install than exterior storm windows. They may be made of glass or various types of plastic. Shrink-to-fit plastic film for making temporary interior storm windows is available at many hardware and building supply stores. This last option is the least expensive for one-time use, but generally undesirable for homeowners. The shrink-fit windows are mainly attractive to renters, who want to reduce their energy bills without paying for permanent improvements to their landlord's property.

Always remember: your home is a system. If you do not correctly adjust and seal your storm windows when the seasons change, they might as well not be there.

Moveable insulation

Most moveable insulation is made from a quilted fabric with fiber batting and one or more layers of reflective foil. Typical R-values range from R-2 to R-4.

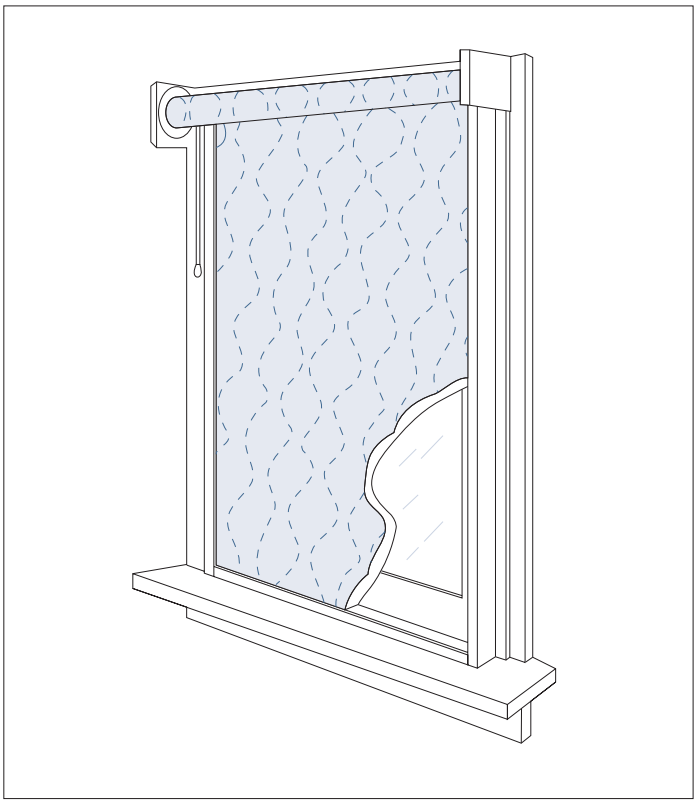


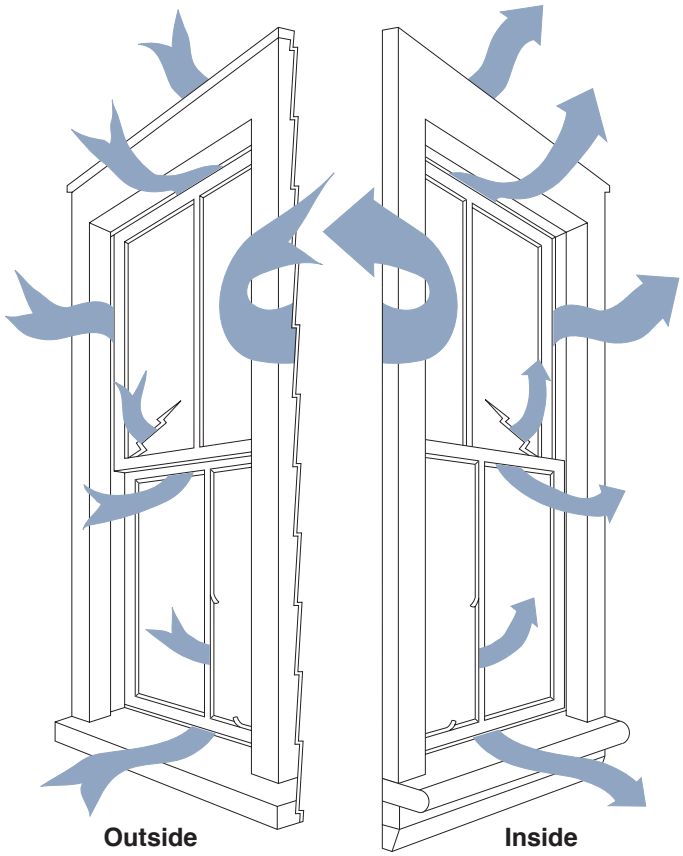
Figure 4-8- Insulated window shades can be a very effective means of reducing hear loss through sinle-pane windows- as long as the shades are used conscientiously.

If you are willing to take the time to operate moveable window insulation, it can be a very cost-effective alternative to storm windows or replacement windows. Moveable insulation not only saves energy by reducing nighttime heat loss during winter, it can also reduce summer air conditioning bills by blocking out the mid-day sun.

(Note of caution: When installed over double-glazed windows, moveable insulation may trap solar heat, causing high temperature build up that may stress the glazing and possibly even cause seal failure.)

Controlling air leakage through windows

Air leakage through windows occurs between all moving parts and around the window frame. Air leakage between the moving parts is controlled with weather stripping; air leakage around the window can be reduced by caulking.



Air leaks in windows

Figure 4-9 - Air leakage is often the primary cause of heat loss from windows and doors.

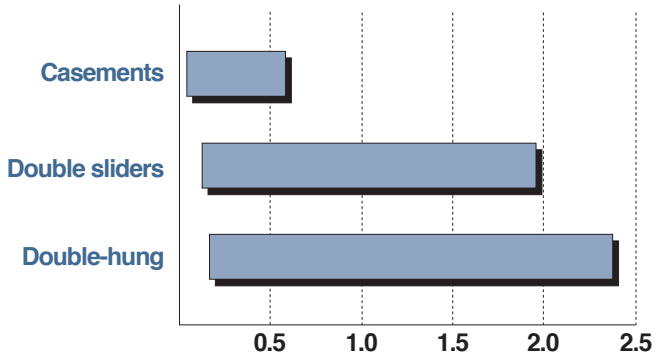


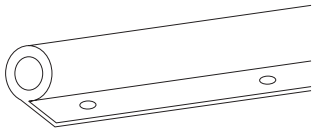
Figure 4-10 - While air leakage rates vary greatly between windows from different manufacturers (the length of each bar above represents the range), in general casement (and awning) windows are tighter than the others.

Among the most common types of windows, casement and awning windows tend to be the tightest, while double-hung windows and sliders are a lot leakier. The difference has to do with the type of weather stripping. Casement and awning windows use compression-type weather stripping-gaskets that get squeezed tight when the window is latched. Double-hung windows and horizontal sliders have a different type of weather stripping that is less effective. There are several easy and practical techniques for reducing air leakage through windows.

Install or repair window locks

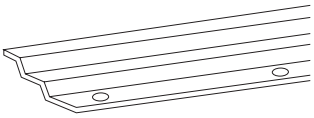
If any of your double-hung windows rattle in their frames, they may be improved by fixing or replacing the lock. This is probably the most cost-effective air leakage control strategy for older windows. Properly installed window locks should pull the sashes together tightly and should hold them firmly against the window frame. Replacement locks are available in most hardware stores.

Tubular gasket



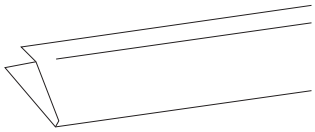
Tubular gaskets are made of vinyl or rubber, with or without a foam filling. They are durable and effective even when gaps around window or door are uneven. Applied from outside, tubular gaskets take sub-zero temperatures well.

Spring metal strip



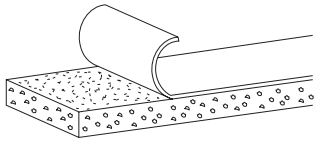
Made of bronze, stainless steel, or aluminum, these long-lasting strips fit unobtrusively in window or door channels and use tension to create a seal. They may make a tight-fitting door or window hard to open.

V-strip



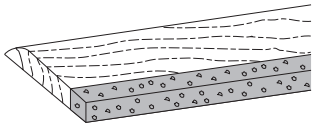
V-strips, made of metal or vinyl, also use tension to create a tight seal. They are installed in window and door channels. Vinyl strips often come with adhesive backing. However, metal V-strips, applied with nails, last longer.

Adhesive-backed foam



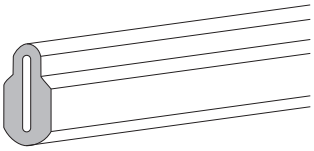
Adhesive-backed foam provides an inexpensive quick fix for a filtration problem. Very easy to apply, the foam may lose its resiliency and effectiveness during a single season.

Foam-edged wood strip



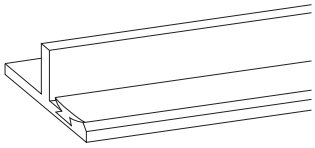
Foam-edged wood lasts longer (and costs more) than plain adhesive-backed foam. Self-sticking, it is easy to install on even surfaces but wears out in several seasons.

Grooved gasket



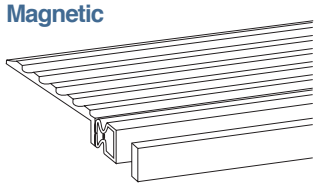
Grooved gaskets, made of various plastics, fit metal casement windows or jalousie windows. Compression makes them effective, and they last 10 years or more.

Astragal



Astragal weather stripping, vinyl or aluminum, is used on double doors (French doors). A T-shaped type consists of a single piece that attaches to the less-used door. Another design interlocks two separate strips, one for each door.

Magnetic



Magnetic seal for gliding doors works like the seal on a refrigerator door. One part, attached to door trim, holds a magnet and a gasket. Other part, attached to door, is metal. The magnet holds door against gasket in a tight seal.

Figure 4-11 - Weather stipping varies greatly in design and cost. The type chosen should be carefully matched with your needs.

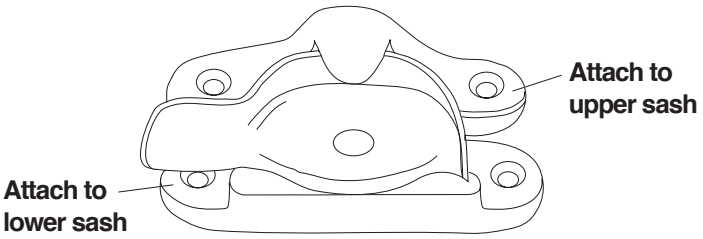
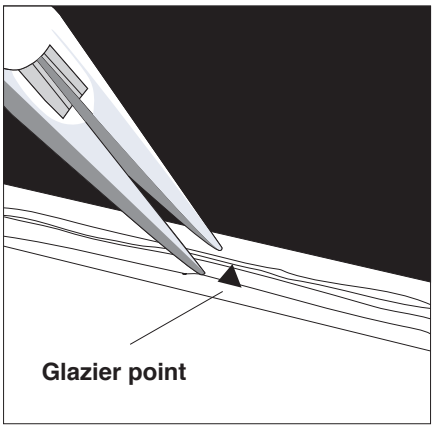
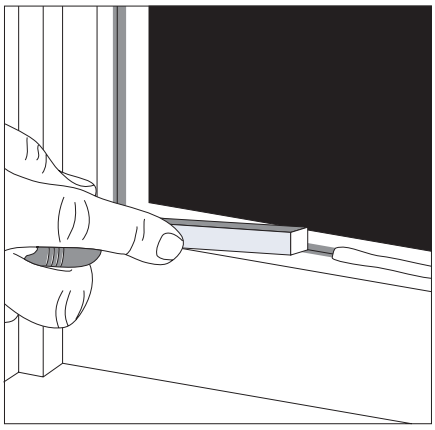


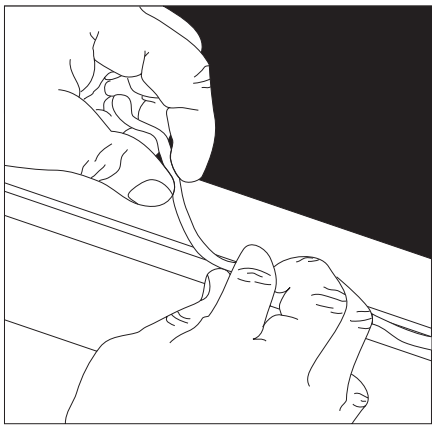
Figure 4-12 - The lock on a double-hung window is not only for security. When working properly, it holds the sashes firmly against the window frame, thus reducing air leakage.



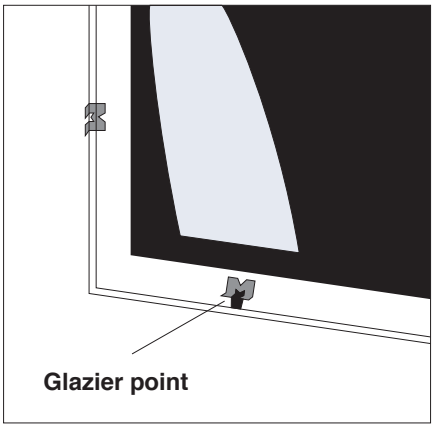
1. Wearing heavy gloves,remove broken pane. Pull out old glazier's points with needle-nose pliers. (Glazier's points come in two styles: diamond, shown here or push type, step 4.)



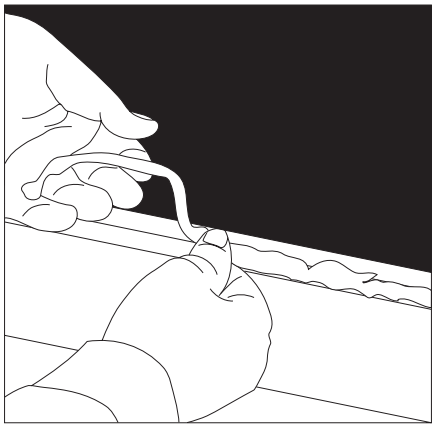
2. Scrape out old compound with a chisel or putty knife. Sand the sash. Paint the raw wood with sealer or primer so that it won't absorb oil from the fresh glazing compound. Measure the opening for the pane, and deduct 1/8 in. from both dimensions. Cut the pane.



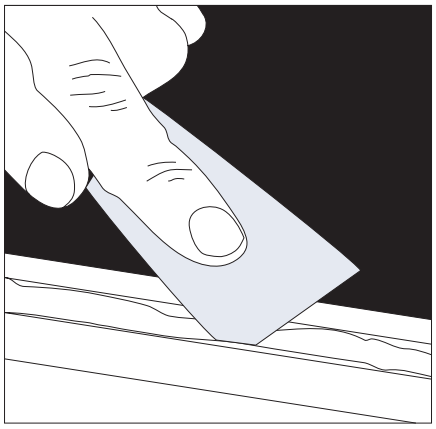
3. Rub a lump of glazing compound between your palms to make a 1/8"-in.-thick rope. Working outside, press this rope around the opening. Set the new pane against the compound, and press firmly, flattening the rope. The excess compound should squeeze out around the glass's edges.



4. Install glazier's points every 4 to 6 in. on the mutins. Be sure the points are snug against the pane. Use an old screwdriver or stiff-bladed putty knife to push them into the wood.



5. Make a slightly thicker rope (about 3/8 in.) of compound. Press this rope over the glazier's points and against the pane.



6. Hold putty knife at an angle and draw it across compound to form a smooth bead. Scrape away any excess that oozed onto the interior pane. When compound has cured (check label for curing time), paint it to match the window, overlapping the glazing about 1/16 in. to seal against moisture.

Figure 4-13 - Replacing window putty

Replace cracked or broken glass

Broken glass obviously permits a lot of air leakage, but even cracked glass can be a problem. Replace all broken or cracked panes of glass.

Weather-strip windows

If a window leaks air when firmly locked or if the original weather stripping is visibly worn or missing, you should install new weather stripping. There are a variety of weather stripping products on the market, ranging from low-cost "rope caulk" -- a putty-like material for temporarily sealing joints on the surface -- to metallic "V-strip" for double-hung windows and rubber compression strips for casement and awning windows.

Costs for weather stripping range from 50¢ to $12 per window.

Repair or replace putty

On most older windows, putty or glazing compound is used to hold the panes of glass in place. Over time this putty cracks and falls out. Old putty should be scraped out with a chisel or putty knife and new putty installed.

Install temporary or permanent storm windows

In addition to lowering the U-value of windows, storm windows also reduce air leakage. See the discussion of storm windows, above, for more on this option.

Caulk around windows

The most effective place to caulk for controlling air leakage around windows is where the window frame meets the interior wallboard. See Chapter 2 for a discussion of caulking materials and techniques.

Window Condensation

Condensation on the inside surfaces of windows is a fairly normal occurrence in most homes. But the fact that it is common does not make it a good or necessary condition. Window condensation occurs when the surface temperature of the glass, window sash, and/or frame is lower than the dew point of the humid air in the immediate living space. The moisture that is naturally present in the air in the form of vapor will change into water when in contact with these cooler surfaces. Condensation on windows can reduce the natural light, obstruct the occupant's view, and cause significant problems like peeling paint, mold, and sill rot.

Condensation can be reduced or eliminated by raising the inside temperature of the glass surface or by lowering the relative humidity of the indoor air. This is why hot air heat registers and baseboard heaters are placed under windows. But energy efficient windows represent the best solution to reducing this condensation build-up. This is done through non-conductive window sashes and frames, low-e-coatings that increase the temperature of the glass, insulating spacers that reduce heat conduction, more air-tight windows, and windows that are filled with convection reducing inert gas. But even with energy efficient windows - remember the house is a system - if the indoor humidity level is high, condensation can occur even on a high performance window. So identifying ways to reduce high humidity and moisture levels in the home is very important. (See Indoor Air Quality in Chapter 5).

Controlling solar heat gain through windows

Solar heat gain can be a blessing in winter, but an energy burden in summer when air conditioners are running.

Most summer overheating problems are caused by solar gain through windows that face east, southeast, west, or southwest. The summer sun is low enough in the early morning or late afternoon to shine directly into these windows. Each square foot of west-facing single-glazed windows can gain 235 Btu per hour at the hottest time of a clear summer day. Three 3' x 4' windows thus can add up to 8,500 Btu during the peak hour–about as much heat as a 2500-watt space heater! Heat gain through skylights is even greater.

During winter, the sun is low in the southern sky. South-facing windows thus transmit lots of useful solar heat in winter and are the basic ingredient of "passive solar design." During summer, when the sun is high in the sky, south-facing windows are easily shaded to avoid overheating.

Suggestions for controlling summer solar heat gain

Shade east and west windows

A variety of shading devices can be used to control unwanted summer sun through east- and west-facing windows. The choice typically boils down to personal preference and cost. Some examples are deciduous trees, porches, awnings, or exterior shade screens (See Landscaping in Chapter 10).

Install solar control films or screens

Special reflective films can be applied directly to windows and skylights to control summer sun. Though effective, they are sometimes aesthetically objectionable because of their shiny appearance.

Close reflective drapes or blinds

If you can't easily shade the outside of your east- and west-facing windows from the sun, your next best solution is to close sun-reflective blinds, drapes, or moveable window insulation on the inside of the windows during sunny days. To be most effective, the outer surface of these shades must be a light color.

Window Replacement

Deciding whether or not to replace old windows can be a difficult decision. Certainly new windows will be much better energy performers if high-performance, air-

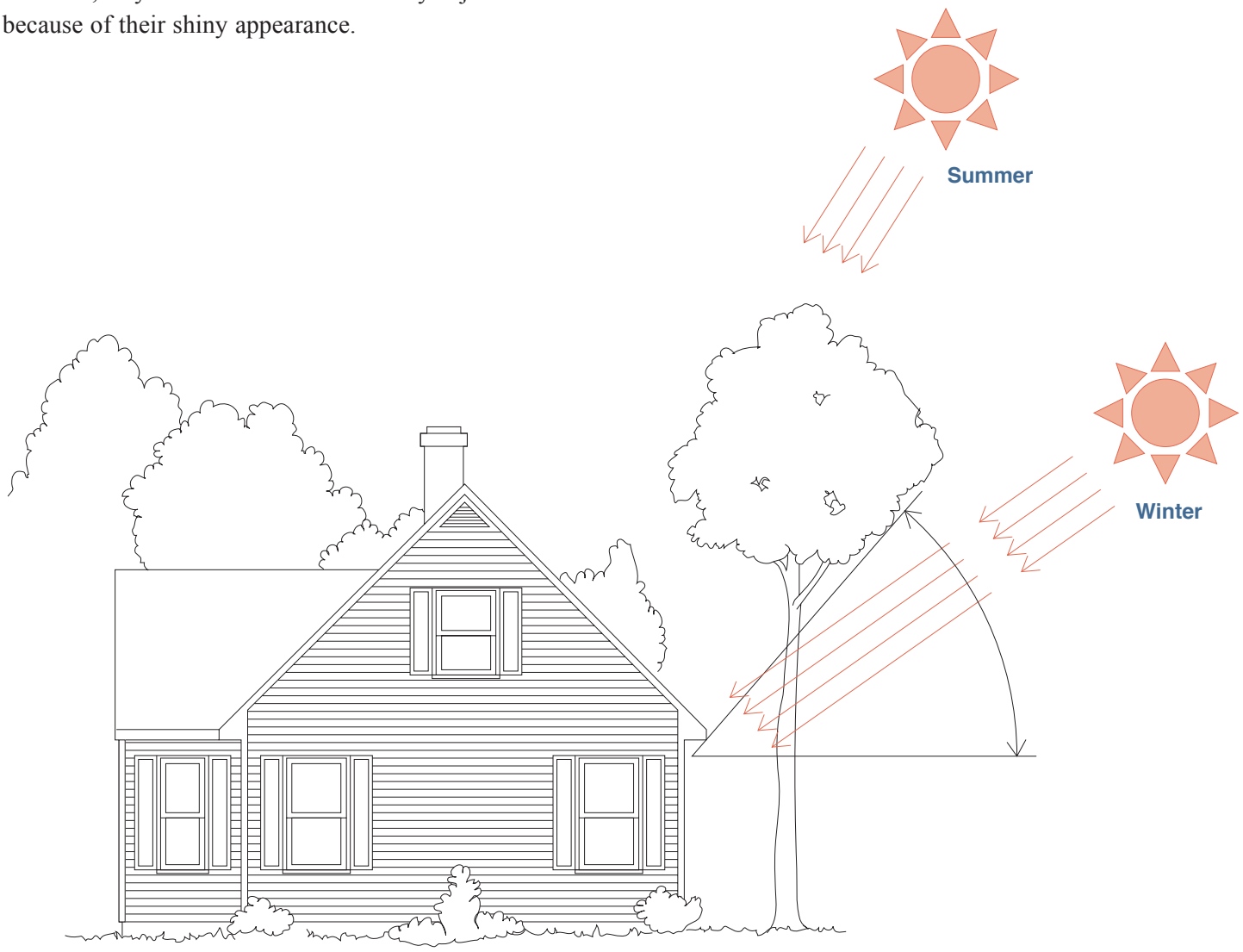


Figure 4-14 -- Trees and overhangs on the south side of a house can block the high summer sun, while allowing the low winter sun to passively heat the house.

tight models are selected. But the cost of window replacement is rarely justified by energy savings alone. Replacement usually only makes sense if your existing windows are rotted or otherwise in extremely poor shape. If your windows are in good shape or easily repairable (new glazing, replacement of broken panes, repainting, etc.), you will probably be better off keeping them and adding separate exterior storm windows or interior energy panels. A professional energy auditor or home performance contractor can help you decide whether window replacement is justified. Be wary of making the decision based on recommendations from someone (typically a distributor of storm or replacement windows) who stands to make money based on your choice.

Understanding Window Ratings

When shopping for new windows be sure to identify those that carry the Energy Star label and certification. The Department of Energy and the Environmental Protection Agency have developed an Energy Star certification for products meeting very specific energy performance criteria. (The Energy Star program is explained more fully in Chapter 7). It is also essential that you identify and study the National Fenestration Rating Council (NFRC) label, which appears on all window products that are part of the Energy Star program. The NFRC label is the only reliable way to determine the energy properties of a window and to compare products. The label displays pertinent information on the four major energy efficient window properties: U-value (U-factor), Solar Heat Gain Coefficient (SHGC), Visible Transmittance (VT), and Air Leakage (AL). Manufacturers are required to present U-factor, SHGC, and VT information. Presentation of AL information is optional.

Figure 4-15- Sample NFRC label

U-value (U-factor)

The rate of heat loss is shown in terms of the U-value of a window assembly, which includes the sash, the frame, and the glass. The insulating value of walls is indicated by the R-value, which is the inverse of the U-value. The R-value is 1 divided by the U-value. For example, if the U-value is 0.25, the R-value is 1/0.25 or R-4.0. Figure 4-16 shows the relationship between U-value and R-value.

The lower the U-value, the greater a window's ability to resist heat flow and the better its insulating value. With a temperature difference of 1 F, insulation with U=1 allows 1 Btu per hour heat flow for each square foot of surface area. In general,

Heat Flow (Btu per hour per square foot) =
Temperature Difference (F) x U-value

Consider the U-value to be the bottom line most important factor in selecting an energy efficient window. The recommended U-value in Virginia is 0.40 or less. The larger your heating bill, the more significant a good U-value becomes. Skylights with a U-value of 0.45 are recommended.

Solar Heat Gain Coefficient (SHGC)

The ability of a window to transmit solar heat gain is measured by its SHGC. The higher the SHGC, the more sunlight admitted through the window, which is more desireable in the winter months because of the free solar heating opportunity that is provided. But for controlling summer heat gain through west and east facing windows look for a lower SHGC.

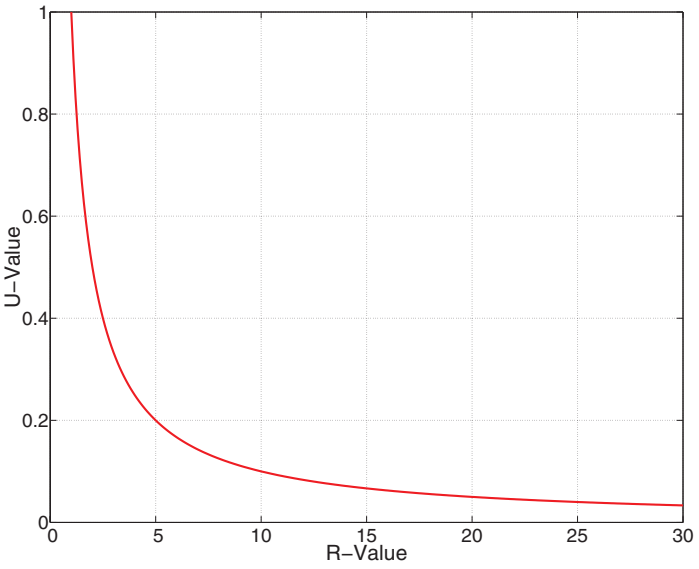


Figure 4-16- Relationship between U-value and R-value

The recommended SHGC for windows in Virginia homes that have high air conditioning bills is 0.40 or less. If your air conditioning expenses are moderate then a SHGC of 0.55 is recommended. While windows with lower SHGC values reduce summer cooling, they also reduce free winter solar heat gain. Skylights should have a SHGC value of 0.55 or less.

Visible Transmittance (VT)

The optical property that indicates the amount of natural light transmitted is called the visible transmittance (VT). The higher the VT the more light is transmitted. Most values are between 0.3 and 0.8. Windows with low solar heat gain usually have lower visual transmittance as well, but low-E windows cut out much invisible heat radiation while still allowing most visible light through.

The recommended VT in Virginia is simply the highest VT that is available for the SHGC required.

Air Leakage (AL)

Heat loss and gain occur through cracks in the window assembly. This is measured in cubic feet per minute of air passing through a square foot of window area at a standard test condition. The lower the AL, the less air will infiltrate through the window assembly.

The recommended AL in Virginia is 0.30 or less.

Window Materials and Design

Two final considerations when shopping for new windows are the frame material and the edge spacers.

Window frames are typically constructed of wood, vinyl, or aluminum. From an energy standpoint, vinyl frames are the best, especially if insulated with foam or fiber insulation, followed by wood and then aluminum. Some aluminum frames improve performance with a "thermal break", a gap filled with wood or plastic to interrupt heat flow, but even these typically don't match the performance of wood or vinyl. Without a thermal break, aluminum frames are unacceptable for the Virginia climate.

Edge spacers hold the panes of glass apart and provide the air- tight seal in a well insulated window. Pay attention to the type of material that the edge spacer is constructed of - if it is metal make sure that a thermal break exists. Silicone foam or butyl rubber are more energy efficient and will improve the energy performance by up to 10%. Choose windows that have long warranties against seal failure, which can result in window fogging and a loss of any low-conductivity gas-fill.

Doors

While there are generally only a few doors in a home, compared to a dozen or more windows, doors may often leak even more than windows.

Improving old doors

Weather strip door

Both sides and the top of a door should be weather stripped with compression-type weather stripping. Make sure the weather stripping is not so thick that it makes closing the door difficult. An alternative is V-strip weather stripping, which should interfere less with opening and closing. Follow manufacturers' recommendations on installation. Cost of weather stripping a door ranges from $8 to $15.

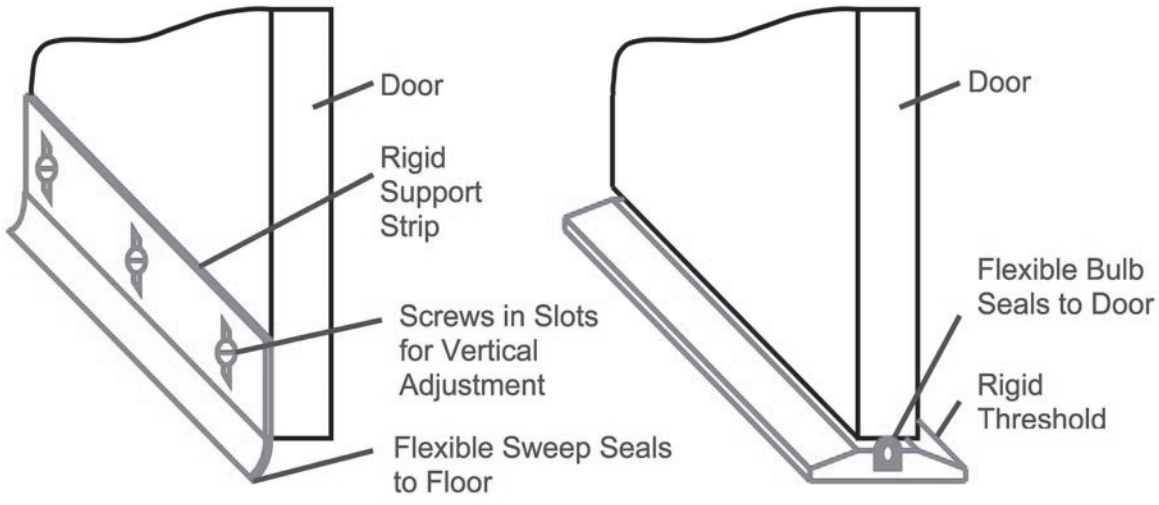


Figure 4-17 – Door Sweep and Vinyl Bulb Threshold

Install door sweep

If there is a gap at the bottom of an exterior door, you should install either a door sweep that attaches to the door, or a vinyl-bulb threshold that creates a seal under the door. A new threshold will cost $10-20, and a door sweep $2-10.

Install storm door

Storm doors are not very cost-effective energy-saving improvements in our climate. The benefits of adding a storm door are that it stops drafts when people enter the home and of course it also becomes the screen door in summer.

Repair existing doors

Both prime doors and existing storm doors may be in need of repair. With wooden doors, look for cracks in the wood that may be allowing air leakage. Also inspect for warping. Some warping can be dealt with using weather stripping, but severely warped doors should be replaced. For doors that contain windows, inspect the glass and the glazing putty and repair or replace as necessary.

Selecting a new door

Shopping for energy-efficient doors is relatively straightforward. The following guidelines should be helpful.

Shop for highest R-value

Manufacturers should list the R-value for their doors in their product specification sheets. In general, insulated steel and fiberglass doors are more energy-efficient than wooden doors. Even if a wood door is necessary for your front entryway, an insulated steel or fiberglass door may be acceptable for back and side entrances.

Check the weather stripping

Pay particular attention to the weather stripping, particularly with wood doors. There is a tremendous difference in quality– and effectiveness– of the weather stripping offered from various door manufacturers. Steel doors often have magnetic weather stripping–magnetic strips mounted in flexible neoprene rubber–that provides the best seal of all.

Check the door construction

Particularly with wood doors, the construction technique can make a huge difference in long-term durability and performance. A door made out of planks of wood glued together, for example, is likely to expand, warp, and twist a lot more than a door made out of multiple laminations of wood.

If you install a new wooden door , be sure to seal it with the appropriate weatherproof stain, paint, varnish, or

sealant. This will prevent the door from warping or expanding due to moisture absorption.

Buy pre-hung doors

Doors that are factory-mounted in frames usually have far closer tolerances and better weather stripping than doors that are mounted in custom-built frames on-site.

Energy Tips and Recommendations

1. Hire a professional energy auditor to provide input, if you are in doubt, on the cost-effectiveness of purchasing new windows versus repairing and improving existing windows.
2. If you install storm windows, be sure to buy windows with low-E glass, have them properly installed and sealed, and open/close them in the spring/fall.
3. If you purchase new windows - be sure to buy Energy Star windows that have an NFRC label, which provides information on the energy properties of the window. Be sure that the Energy Star windows are suited for your climate region.
4. Make sure that you compare the U-value, Solar Heat Gain Coefficient, Air Leakage, and Visible Transmittance factors that are displayed on the NFRC label before purchasing new windows.
5. If you have high levels of condensation on the interior surface of your window glass then consider making them more energy efficient and/or reducing the relative humidity inside your home.
6. Understand the need to control summer solar heat gain through your windows and to maximize solar heat gain in the winter.
7. Purchase windows that have good warranties against seal failure, which will allow windows to fog and low-conductivity gas to leak and be lost.
8. Purchase windows that have wood and vinyl frames. Do not purchase aluminum- framed windows unless they have a thermal break.
9. Energy inefficient doors can be repaired with new weather stripping, threshold replacement and new door sweeps.
10. If you purchase a new door, buy an Energy Star certified door that will be well insulated and energy efficient.
11. It is always a good idea to have all new windows and doors installed by a professional. The installation process can directly impact the energy performance.