# Buying energy efficient windows

**FACT SHEET**



APARTMENT & CONDO EFFICIENCY SERVICES

**ENERGY STAR PRODUCTS**

HOME PERFORMANCE WITH ENERGY STAR

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Energy efficient windows are a common home improvement that offers substantial benefits to the homeowner. Besides improving your home's appearance, efficient windows are more comfortable to sit by, less drafty and save energy on heating bills. However, to shop for efficient windows effectively you need to understand some window technology and terminology. With this knowledge in hand, you will be able to make an educated, cost-effective purchase.

## HOW ENERGY EFFICIENT WINDOWS WORK

Energy efficient windows use several technologies to limit heat loss.

**Multiple panes.** Multiple panes limit heat loss by trapping a layer of insulating air. This air layer acts much like a coat, creating a still layer of air between the warm inside air and the cold outside air. Dual panes are now standard for most windows.

**Gas fills.** Gasses such as argon and krypton are heavier than air, thereby slowing the movement of heat between the glass panes.

**Low-emittance coatings.** These coating are thin, invisible layers of metal put down on the window surface to reflect heat like a mirror. To get an idea of the effect of these coatings, take a piece of aluminum foil and hold it over the back of your hand. You will feel the heat being reflected back. The low-e coatings have the same effect, reflecting back interior warmth into the room instead of letting the heat go out of the house through the glass.

**Spacers and frames.** Spacers are strips of material that separate panes of glass. Since spacers conduct heat between the panes, they should be made of low heat-conducting material such as silicone or steel. This will make the window more efficient and minimize condensation around the edge of the glass. Good frame materials are also important. Wood, vinyl, fiberglass and composites are the most energy efficient.

## BENEFITS OF ENERGY EFFICIENT WINDOWS

Properly selected windows do more to make a home attractive, pleasant and comfortable than any other single component. Today's windows are a vast improvement on what was available even one decade ago and offer several benefits.

**Good windows let light in but keep the cold out.**

**Heating bill savings.** On a cold winter day, up to 30 percent of a home's heat can be lost through poor windows. The energy savings from new windows can easily add up to $100 a year.

**Improved comfort.** Efficient windows leak less cold air. Because the glass is warmer, they are also more comfortable to be near.

**Reduced condensation.** Efficient windows are much less likely to develop condensation in the wintertime.

**Reduced fading.** Low-e coating can block ultraviolet light that leads to fading of fabrics and carpets.

Keep in mind that energy efficient windows rarely pay for themselves in energy savings alone. Consider wall and ceiling insulation and air sealing as highly cost effective ways to reduce your heating and cooling bills. Look at new windows as a home improvement that increases comfort, improves ease of operation and reduces maintenance, saves energy and may improve resale value.

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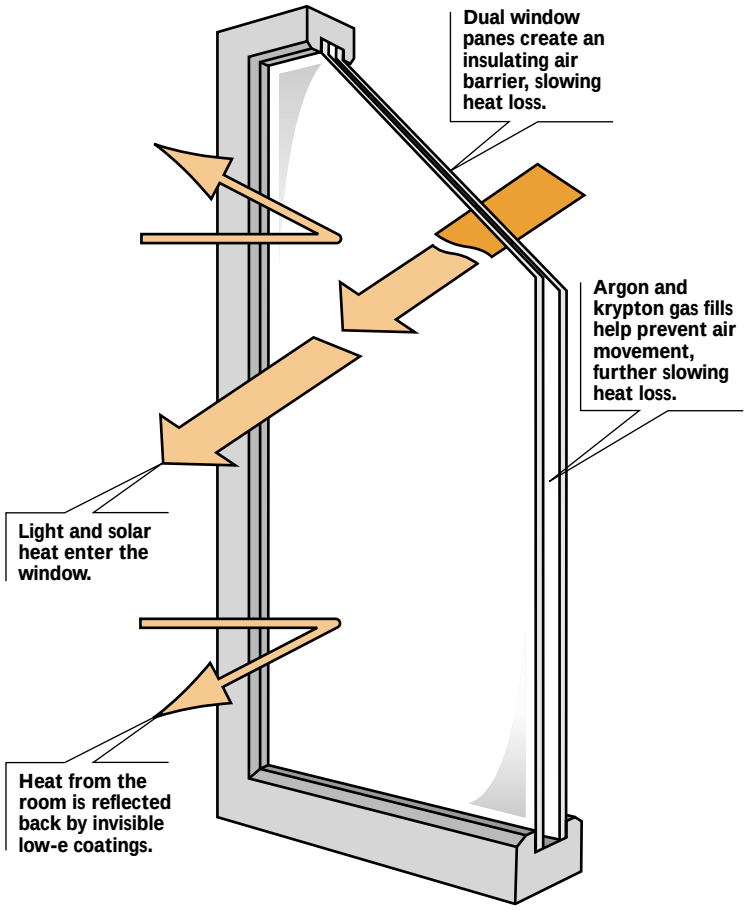
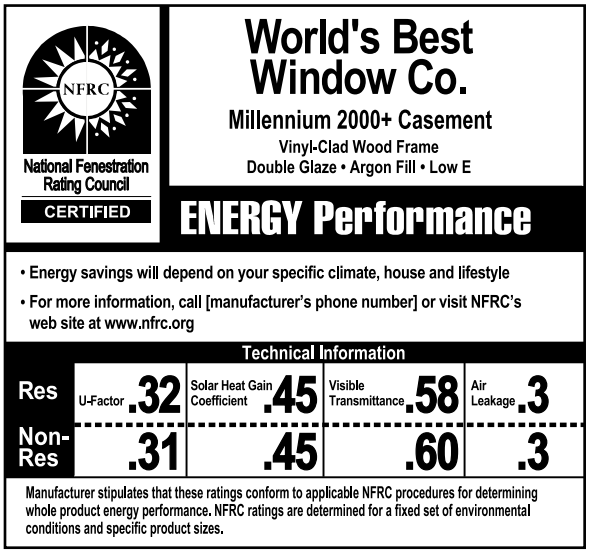
## HOW ENERGY EFFICIENT WINDOWS WORK





(left) **U-factors and R-values are related ways to measure insulating ability. R-values measure wall insulation. U-factors measure window insulation. Lower U-factors mean better insulation.** (below) **National Fenestration Rating Council's labels for windows.**





## WINDOW PARTS

The most important parts of a window are the frame and sash. The sash holds the glass unit and swings or slides to open. Window components are often protected from weather with an aluminum or vinyl shell called cladding. Vinyl cladding is more energy efficient than aluminum. Frames are often designed so that several window types can be attached or "mulled" together into a variety of configurations.

Dividers are given several interchangeable names such as dividers, grilles and muntins. Dividers sometimes reduce the energy efficiency of a window. They can also diminish the amount of light that enters a room.

## SHOPPING FOR EFFICIENT WINDOWS

Buy windows with independent, laboratory-verified proof of performance. The easiest way to do this is to shop for units with the ENERGY STAR® label. An ENERGY STAR qualified window is your assurance that you are buying a product that is among the most efficient in its class.

ENERGY STAR qualified windows must meet two requirements—they must have a minimum insulating ability and be rated through the National Fenestration Rating Council (NFRC). Insulating ability is measured by the U-factor. The lower the U-factor the more efficient the window. In Wisconsin, the minimum U-factor requirement for ENERGY STAR windows is 0.35.

The NFRC rating system allows you to directly compare energy performance between different manufacturers. Nearly all major window manufacturers are participating in the program. NFRC produces a distinctive energy performance label to help you in shopping for an efficient window. The NFRC label provides values that apply to the entire window, including the sash and frame—not just the

center of the glass. Rely on this label, not on demonstrations that claim to show how just part of the window performs.

## ENERGY PERFORMANCE LABELS

The energy performance label describes the window and provides information on how well it insulates against heat loss, limits heat gain from sunlight, transmits visible light and reduces air leakage.

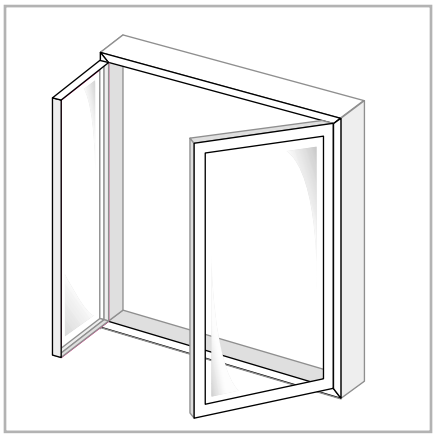
**U-factor.** U-factor measures the rate of heat loss. The lower the U-factor, the better the window's insulating value. Choose windows with a U-factor of 0.35 or less. A difference of 0.05 in U-factors can translate into energy savings of $500 over the average 30-year lifetime of windows.

**Solar heat gain coefficient.** The higher a window's solar heat gain coefficient, the more solar heat is allowed to pass through. To reduce heating bills, choose the highest solar heat gain coefficient you can find so that winter sunshine can help heat your home. Most products offered are between 0.3 and 0.6.

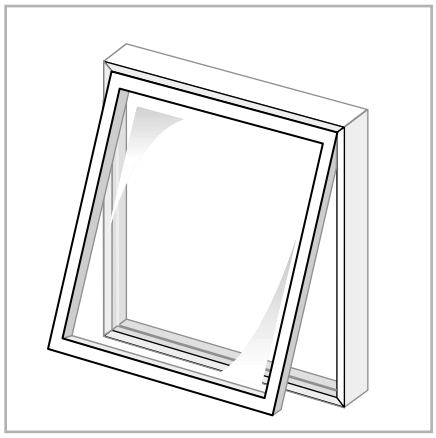
**Visible transmittance.** A high visible transmittance means more daylight is transmitted through the glass. Choose a high visible transmittance window to maximize daylight. Windows with lower visible transmittance can be used to control glare.

**Air leakage.** Air leakage is measured in cubic feet of air

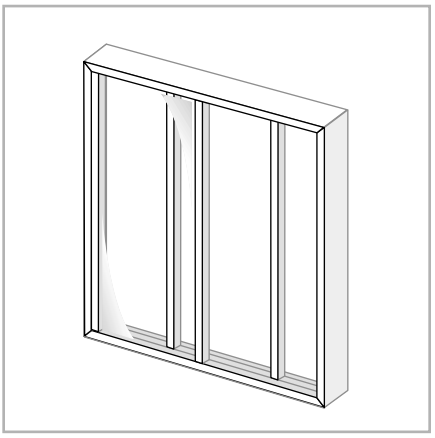
## WINDOWS ARE CHARACTERIZED BY HOW THEY OPERATE



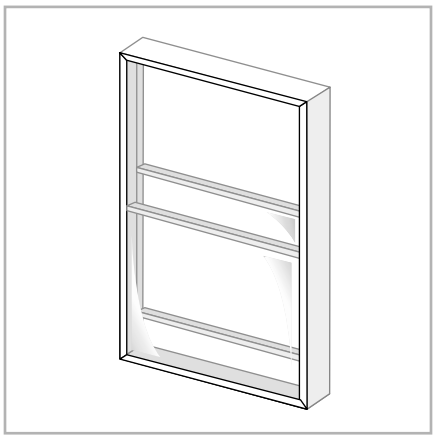
**CASEMENTS are hinged on one side, crank open and project outward from a wall.**



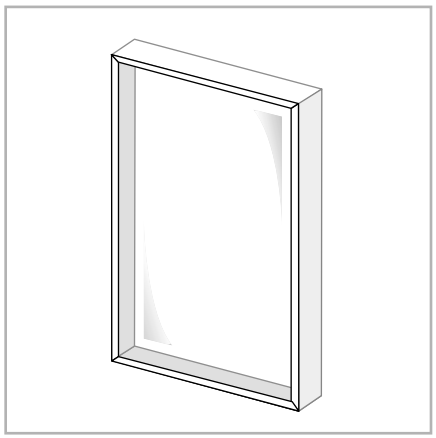
**AWNINGS are like casements turned on their side.**



**HORIZONTAL SLIDERS have sashes that slide sideways; one or both sashes may slide.**



**SINGLE OR DOUBLE HUNG slide up and down in a vertical track. If the upper window can't move, the unit is called single-hung. If both move, it is double-hung.**



**FIXED windows don't open at all.**

**Windows can be challenging to install. Hire a qualified contractor.**

**A few notes on efficiency: Sliding windows and single or double-hung windows need good weatherstripping systems to prevent leaks and drafts. Casement windows shut very tight and are usually quite efficient. Most window types can be improved with a storm window.**

Money Isn't All You're Saving

**Rely on this logo to guide you to an energy efficient window.**

per minute passing through a square foot of window area (cfm/ft$^2$). Look for air leakage values of 0.30 or lower. While it is desirable to choose a window with low air leakage, air leakage is not as important as U-factor and solar heat gain coefficient.

Soon, window labels will be displaying new information about condensation resistance. When the new labels appear, check the Efficient Windows Collaborative Web site for more information (see Learn More).

## OTHER CONSIDERATIONS

You can maximize the benefits of your new windows by picking different windows for different parts of the house. For example, on the north side you could choose windows with a high visible light transmittance to maximize daylight. On the south side you could choose high solar heat gain coefficient windows to maximize winter heat gain. (However, the windows should have an external overhang to reduce summer heat gain.)

Quality window installation is important. You can buy the most efficient window in its class and still have poor performance if the window is not properly installed in the wall opening. Cracks and gaps around the window frame lead to air leakage and reduce efficiency. Be sure to hire a qualified window installer so that you get the most for your window dollar.

## LEARN MORE

**focusonenergy.com**

Contact Focus on Energy to learn more about smart energy choices.

**efficientwindows.org**

The Efficient Windows Collaborative Web site provides additional information on window technology and energy efficiency. This Web site also contains a calculator for estimating your energy savings and a listing of efficient window manufacturers.

**nfrc.org**

This is the National Fenestration Rating Council Web site. Their online products directory has energy performance data for windows, doors and skylights.

**energystar.gov**

This site provides information on energy efficient products that meet ENERGY STAR standards.



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