SATURN
RESOURCE MANAGEMENT

Selecting New Windows

There are a variety of energy selection criteria for new windows, depending on climate and the building owner's maintenance and specification requirements.

Window selection criteria depend on a number of factors including: climate coldness (in heating degree days [HDD]), its sunniness (both winter and summer), the window's orientation, and the light, ventilation, and heat it's expected to provide.

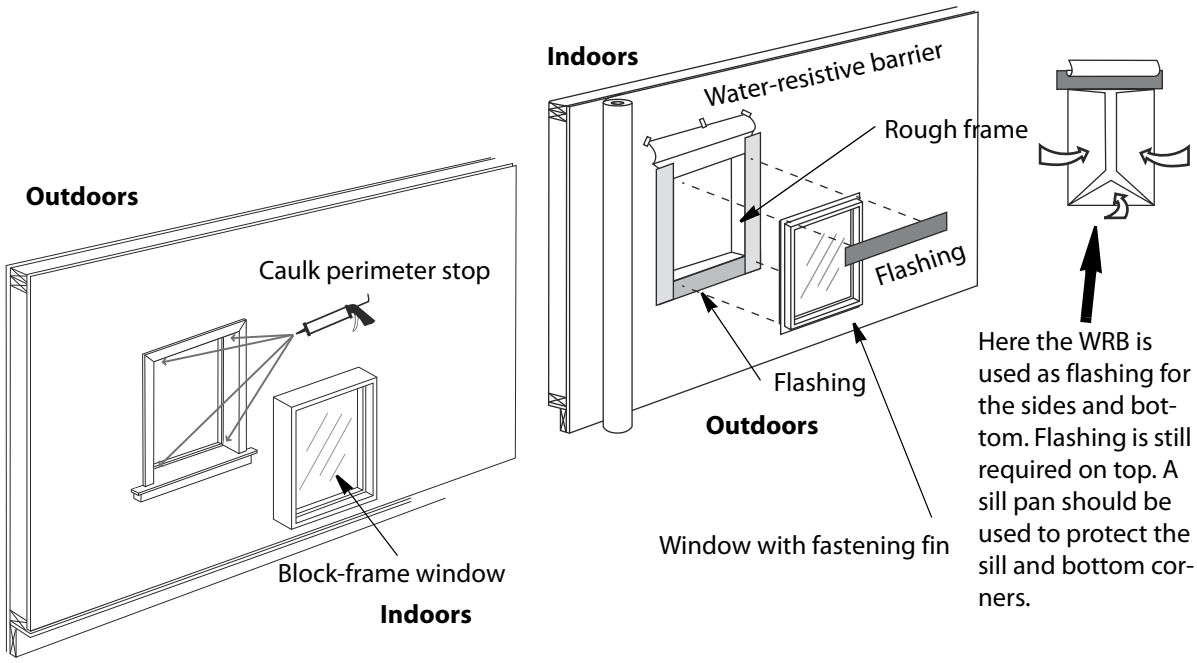
U-factor is the most important criterion for cold climates. Don't replace windows in northern climates without making a significant reduction in U-factor. U-factors for windows range from 1 to about 0.18. A U-factor of 0.35 is often given as a maximum for cold climates, but lower is better to minimize heat transmission and window condensation.

In the warmest U.S. climates, windows should have window shading coefficients of less than 0.25, a figure that includes exterior and interior shading devices. An SHGC of 0.4 or less for the window glass would be a good start toward achieving the 0.25 shading coefficient.

Low-e double-pane glass returns its investment in all but the very hottest U.S. climates. The exterior pane's interior surface is the best place for the low-e coating for cooling-dominated climates. In heating-dominated climates, the low-e coating should be on the exterior surface of the interior pane.

Buildings in cold climates should have a U-factor of less than 0.35. If solar heating from south-facing glass is part of a building's heating strategy, select glass with at least 0.7 SHGC, which requires insulated glass with a high-transmittance low-e coating. West-facing glass and east-facing glass should have a SGHC of less than 0.30 in hot climates when a building is air conditioned.

Installing Block-Frame and Fastening-Fin Windows



Drawings here show two window types and their installation. The block frame window is common in masonry buildings and is installed from indoors against a perimeter stop. The fastening-fin window is installed from outdoors and flashed into the wall's water-resistive barrier.

Window Replacement

Replacing windows generally has a long payback period, or a small return on investment. However, if a building is well insulated and the heating and air conditioning system is efficient, window replacement may be the logical next step to making the building more energy efficient.

The most important consideration for window replacement is sizing the windows correctly. This may involve removing casing or drilling holes in the window frame to locate the rough opening's boundaries. The installer gives the window supplier either the rough opening size or the window-frame size, depending on the method of installation.

Installation options — There are three common options for installing new windows:

1. Installing the custom-sized window inside the existing window frame. This is often done when replacing double-hung windows with vinyl or aluminum windows.
2. Installing a custom-sized window in the existing rough opening. Most window replacements use this option.
3. Installing a standard-sized window in a resized rough opening is the most expensive option, because it may involve installing a new header (beam) above the new window opening, as well as disturbing siding and interior finish.

Installing a new window in the old window frame is the cheapest but often the least satisfactory option. If the window is worn out, its frame is probably fairly worn too. Using the old window

frame, while cheaper, should only be used when the existing frame has a beautiful interior finish and an exterior finish that will hold paint.

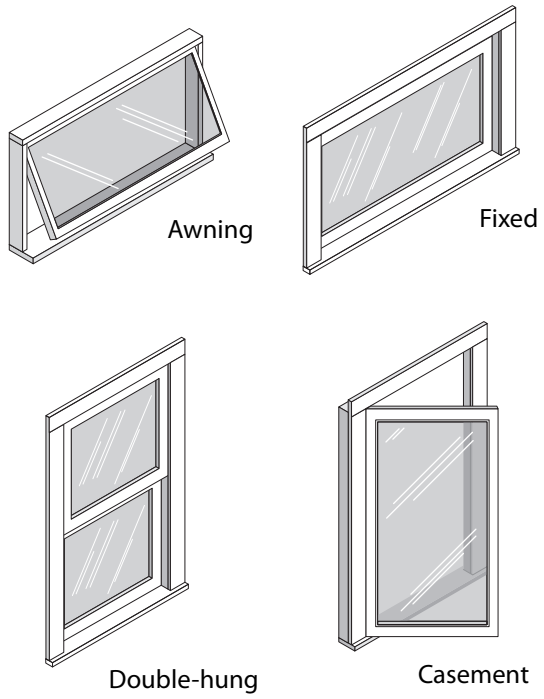
Using the existing rough opening gives a much more original-looking appearance than using the old window frame and facilitates better air sealing. Installing the new window in the existing rough opening requires considerably more labor than installing the new window in the existing window frame but considerably less than building a new rough opening. Resizing the rough opening, especially enlarging it, approximately doubles the labor cost over using the existing rough opening.

Rough openings are typically $1^1/_2$ to 2 inches larger than the window frame. Since air leakage around new window sashes is quite low, leakage around the frame should be low too. Many window installers use non-expanding one-part polyurethane foam for filling the gap between window frame and rough opening. In some cases, expanding foam can warp a window or door frame.

Durability issues — The modern approach to window replacement is to provide a low-maintenance window exterior. Vinyl, metal, or fiberglass qualify as low-maintenance materials.

Replacing the window often involves repairing water damage to the siding or interior finish around the rough opening. Protecting the new window from moisture damage outdoors involves flashing the window's top with metal flashing that goes under the siding and over the window casing. The remainder of the window perimeter should be sealed with caulking chosen according to the materials bordering the joint.

Types of Windows



Exemplary window replacement — Energy specialists should encourage customers to consider replacing both windows and siding to facilitate the installation of insulated sheathing under the new siding. Thermal bridging in wall assemblies is one of the main challenges to making existing frame buildings more comfortable and energy efficient. Windows have large areas of thermal bridging surrounding their perimeters—typically 4 to 12 inches from the window frame. Replacing the old thermally inefficient windows, therefore, solves only part of the thermal-resistance problem.

Another reason to replace windows and siding at the same time is to facilitate the integration of window flashing with the wall's water-resistive barrier. Many replacement windows are installed inadequately, creating water and air leaks. Properly integrating new window flashing with the home's existing water-resistive barrier without removing the siding can be difficult.