GLASS & WINDOWS

In Southwest Florida, 30 percent of the summer cooling load is attributed to glass and windows. The use of glass as a home building material is becoming more and more popular. This proliferation of glass causes special concerns for homeowners in a summer-dominant climate because glass and windows offer an avenue through which solar heat can enter the home.

All transfer of heat energy occurs as the result of convection, conduction or radiation. Convection occurs when heat energy, embodied in a substance, usually air, moves from place to place as the embodying substance moves. According to the Florida Solar Energy Center, convection caused by leaky window gaskets or door thresholds account for only three percent of the typical home's air conditioning load.

Conduction occurs when heat energy moves from molecule to molecule through a substance. The greater the difference in temperature, the greater the conducted heat flow.

Substances that resist heat flow are said to be good insulators measured in R-values. Although glass has a low R-value, the typical summer temperature difference between outside and inside a Southwest Florida home is very small (10 to 20 degrees Fahrenheit). The amount of heat that can be conducted into your home through windows is equally small. This is why multi-pane glass does not provide a reasonable payback in Southwest Florida, unless a "spectrally selective" window is chosen.

Radiation is the process by which most heat energy enters homes in Southwest Florida. Every object embodies or stores heat energy and some of this heat energy leaks away in the form of infrared radiation or radiant heat. This heat is very difficult to reflect because it travels in a straight line. Clear glass windows offer practically no resistance to radiant heat. Radiant and solar heat together account for 31 percent of the heat load on the typical air-conditioning system, with 26 percent of all heat loads coming right through the windows in the form of sunlight.

Tips from our experts...

- Significant air conditioning savings can be attained by blocking solar heat before it reaches the windows, or by using special heat-reflecting glass or heat-reflecting glass coatings (residential window tint).
- Reflective glass or reflective glass coatings should be rated to reflect at least 65 percent of all solar heat to be considered efficient in Southwest Florida.
- Internal window coverings trap solar heat between them and the window glass until the heat energy warms the air in that space. The heat-laden air flows up to the ceiling where it waits for the air conditioner to cycle on and draw it in though the filter. This creates an illusion of efficiency when, in fact, the load on the air conditioner has not been altered.
- Awnings, storm shutters, shade trees and porch or lanai roofs are all very effective in blocking solar heat. To be 100 percent effective, the exterior shading device must never allow direct sunlight to touch the window's surface.
- East or west windows are the main source of intrusive heat. It is recommended to use shading devices and tint on east and west windows since they experience many hours of direct sunlight.
- South-facing windows experience a great deal of direct sunlight in the winter months when the sun rides lower in the sky. In the summer, south-facing windows are largely shaded by the overhanging soffit of the roof.
- Skylights experience many more hours of direct sunlight than any vertical window and should be avoided if possible.
- It is difficult to utilize shading devices to block the sun from entering skylights. Existing skylights can be tinted, covered, blocked or shaded to lessen their load on the air conditioner.

Meter registered 106°F. on an eastern exposure window with no film.

For more information, please refer to the report by the Florida Solar Energy Center titled "Industry guide to selecting the best residential window options for the Florida climate (www.FSEC.UCF.EDU/EN/publications/PDF/FSEC-PF-358-00.pdf).