Potential Energy Savings:

High performance windows offer heat loss reductions of at least 35% and solar gain reductions of at least 45%. There are numerous products and design options available to select the ideal combination of efficiency and desired benefits.

Installing low conductance framed windows with spectrally-selective glazing in a typical 2,000 square foot coastal San Diego home with 300 square feet of equally distributed windows (15% of the floor area) will save approximately $70-100 per year over aluminum framed windows with clear, single-pane glass.

Efficient and well-designed fenestration systems offer:

- Heating and cooling energy savings
- Improved daylight and views
- Reduced condensation
- Improved comfort
- Less fading

Additional Information:

Rebates are available for high performance windows and glazing through San Diego Gas & Electric's efficiency programs at **www.sdge.com**.

Case Study:

Two identical 1,850 square foot unoccupied homes in Sacramento with about 300 square feet of windows were outfitted with equipment to simulate occupancy use patterns over a period of 16 days. One had standard dual-pane clear glazing and the other had dual pane low-e glazing. The results of the test showed a 30% reduction in air conditioning energy use and peak electrical loads with the more efficient glazing. Besides enhancing thermal comfort, the AC unit in the house with the Low-e glass could be downsized by 1 ton compared to the house with standard clear glass, saving about enough to pay for the glass upgrade.

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SDERC

San Diego Regional Energy Office

Fenestration

Technology Description:

Fenestration is an architectural term referring to openings in the building envelope that are designed to permit the passage of air, light and people, such as, windows, doors, skylights, atriums, solariums, and structural glazing systems.

Application:

Efficient fenestration products reduce heating and cooling energy when they:

- Have high performance characteristics
- Are tuned to the specific microclimate
- Strategically utilize operable from non-operable configurations
- Are placed in optimum locations of the building envelope

In addition, the *total* fenestration unit performance should be examined – taking into account *both* the glazing as well as the frame system. Since the sash and frame represent from 10 to 30% of the total area of a typical window unit, the frame properties will influence the total window performance. Fixed and hinged operation units also have less air leakage than sliding units.

The future of fenestration will focus on optimizing its integration within the building, adding information display capabilities, continuing to address energy supply and efficiency, offering environmental harmony, and enhancing traditional features.

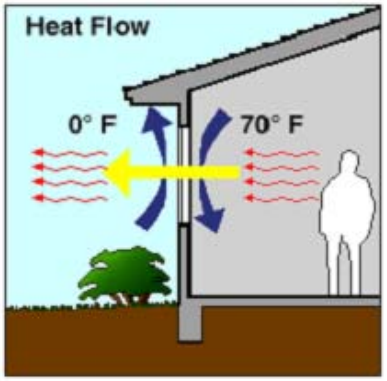
Fenestration

Fenestration Energy Performance Ratings:

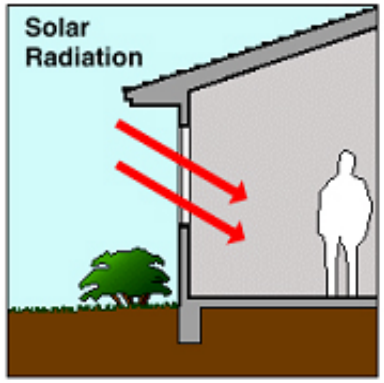
The National Fenestration Rating Council (NFRC) has developed a window energy rating system based on whole product performance. The *NFRC label* provides the only reliable way to determine the window energy properties and to compare products. The NFRC label appears on all products certified to the NFRC standards and on all window, door, and skylight products that are part of the Energy Star program.

Look for the following performance factors:

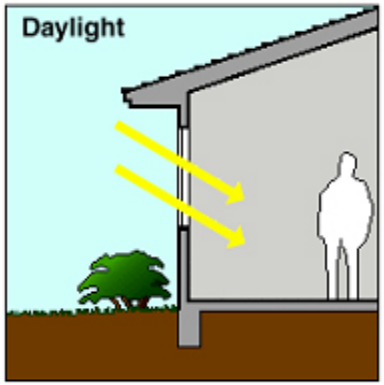
•U-Factor
The rate of heat loss is indicated in terms of the U-factor (U-value) of a window assembly. The insulating value is indicated by the R-value, which is the inverse of the U-value. The lower the U-value, the greater a window's resistance to heat flow and the better its insulating value.



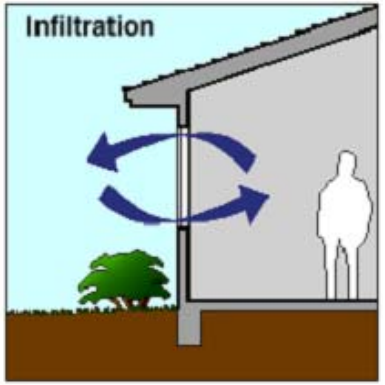
•Solar Heat Gain Coefficient (SHGC)
The SHGC is the fraction of incident solar radiation admitted through a window. This includes both the portion that is directly transmitted through a window, as well as that portion that is absorbed and subsequently released inward. SHGC is expressed as a number between 0 and 1. The lower a window's solar heat gain coefficient, the less solar heat it transmits.



•Visible Transmittance (VT)
The visible transmittance (VT) is an optical property that indicates the amount of visible light transmitted. The NFRC's VT is a whole window rating and includes the impact of the frame which does not transmit any visible light. While VT theoretically varies between 0 and 1, most values are between 0.3 and 0.8. The higher the VT, the more light is transmitted. A high VT is desirable to maximize daylight.



•Air Leakage (AL)
Heat loss and gain also occur by infiltration through cracks in the window assembly. It is indicated by an air leakage rating (AL) expressed as the equivalent cubic feet of air passing through a square foot of window area. The lower the AL, the less air will pass through cracks in the window assembly.



Considerations:

From an energy perspective, the ideal glazing system for warm climates is optimized to admit as much light as necessary to illuminate the space without causing glare, while minimizing solar heat gain and ultraviolet transmission. The SHGC and U-Factor in particular are "tuned" for the microclimate and orientation. These glazing products are called "spectrally-selective" since they select the desirable from the undesirable portions of the solar spectrum.