



Money Isn't All You're Saving

# Improve Energy Efficiency with High Performance Windows

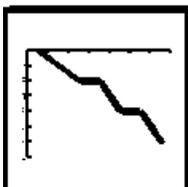
## Builder Guide



### DESCRIPTION

Windows typically comprise 10% - 25% of the exterior wall area of new houses in the United States. This represents a major pathway for thermal energy to enter and leave a house. According to national experts, windows in heating-dominated climates are responsible for approximately 25% of a typical house's heat loss in the winter. In cooling-dominated climates they can be responsible for 10% to 50% of the cooling load.

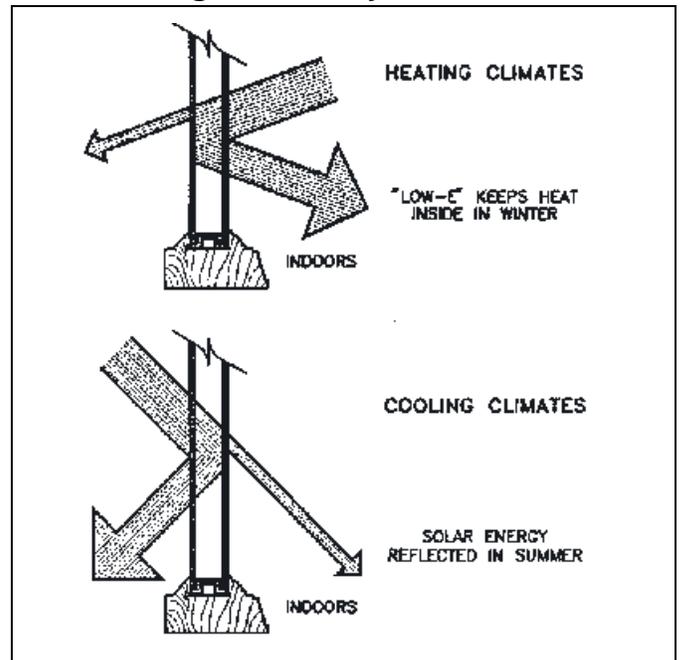
Technologies are available to enhance the energy performance of windows, but they must be selected based on climate. While one technology may help reduce the heating load, it may also increase the cooling load. Technologies should be selected based on the dominating space conditioning load (heating or cooling). Technologies available in many combinations include: multiple glazings, better insulated frames, low-emissivity ("low-E") coatings, tints, low-conductance gas fills, warm-edge spacers, and improved weatherstripping. In addition, careful and thorough caulking/sealing of window frames can significantly reduce infiltration of air around windows. This is important because infiltration is a major cause of uncomfortable cold drafts (see "Preventing Leakage" fact sheet).



### BENEFITS

Providing a comfortable, energy efficient house with high efficiency windows can improve comfort, increase customer satisfaction, reduce callbacks, and increase referrals. Look for a more desirable product to increase business and profits.

### High Efficiency Windows



- High performance windows reduce energy use.**

Using high efficiency windows reduces energy use for heating and cooling. Lower energy use results in lower energy bills, making the home less expensive to operate and more attractive to buyers.

- High performance windows improve comfort.**

High efficiency windows are warmer in winter and cooler in summer. For instance, the inside surface of a "low-E" window can be more than 10°F closer to indoor air temperature than a standard window. Surface temperatures are so important because radiant effects have 40% more impact on comfort than air temperature (i.e. notice the comfort people feel basking in the sun on even a cold winter day.) High efficiency windows also improve comfort by reducing drafts and facilitating more even temperatures throughout the house.

**Lower UV transmission reduces fading in fabrics.**

High technology windows with low-E glazing or heat mirror films can block more than 90% of the sun's harmful invisible ultraviolet radiation. This reduces the potential for fading and damage to curtains, window treatments, carpeting and furnishings. Best of all, low-E coatings and heat mirror films are virtually invisible to the eye - just like looking through clear glass.

**High performance windows can increase noise dampening.**

Multiple glazings and lower U-value windows reduce unwanted noise from the outside. This can result in quieter, higher quality homes.

**High performance windows can reduce condensation.**

Moisture development on windows in the winter can often lead to mold and mildew build-up and fabric stains. Condensation occurs when warm air comes in contact with a cold surface (i.e. a typical window). As the air is cooled it loses its ability to hold moisture. The warmer surface of a high performance window during cold weather significantly reduces this potential for condensation.

**High performance windows can also provide better quality.**

Look for high efficiency windows to be constructed with higher quality materials that can result in stronger, easier to operate, and longer lasting windows. Moreover, your customers are likely to appreciate the reduced risk of technology obsolescence where new housing continues to shift to high performance windows.



**INTEGRATION**

**Selecting the proper performance characteristics.**

The trade-offs between solar gains and heat loss should be considered when selecting windows. Severity of climate is the most important factor. Hot climates should stress low shading coefficient

windows (i.e. low E, tint) with more concern for solar heat gain reductions than indoor- outdoor

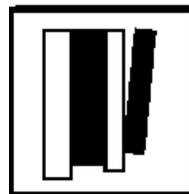
**Typical Characteristics of Windows Types**

Window	U-value	SHGC	Air Leakage (cfm/sf)
Double glass, Alum. frame, thermal break	0.60 - 0.70	0.65 - 0.07	0.56
Double glass, Wood or vinyl frame	0.50 - 0.55	0.55- 0.60	0.56
Double glass Low-e, Wood or vinyl frame	0.30 - 0.35	0.35 - 0.50	0.15

temperature difference. Cold climates should stress low U-value (i.e. Low E with gas fill) with less concern for shading coefficient.

**Proper sealing around window frames.**

To minimize heat loss around window frames, the shim space must be insulated and sealed. Sealing is usually provided with a non-expanding foam insulation, tape, or a plywood wrap. To be effective, both the wall air barrier and the window jamb must be sealed to the rough opening. With foam sealing, the window should be shimmed into the rough opening with approximately 1/2" gap on all sides for best results.



**RESOURCES**

- Residential Windows, A Guide to New technologies and energy performance.* Available at 612-851-9946.
- National Fenestration Rating Council (NFRC) Certified Products Directory, Fifth Edition,* November 1995. Available at 301-589-6372.
- Canadian Home Builder's Association Builder's Manual,* 1994. Available at 1-800-346-0104.



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- Residential Windows*, John Carmody, Stephen Selkowitz and Lisa Heschong, W.W. Norton & Company, New York, 1996