PHI Professional Home Inspection Co.

Our Mission Statement:
To Help People Make Informed Real Estate Decisions.

Modern Window – Facts & Considerations

Windows bring light, warmth, and beauty into buildings and give a feeling of openness and space to living areas. They can also be major sources of heat loss in the winter and heat gain in the summer. In 1990 alone, the energy used to offset unwanted heat losses and gains through windows in residential and commercial buildings cost the United States $20 billion (one-fourth of all the energy used for space heating and cooling).

Facts

1. **U-Value opposite of R-Value:** Manufacturers represent the energy efficiency of a window in terms of its U-Value (conductance/transfer of non-solar heat from one side of the window to the other measured in BTU's), or its R-Value (resistance to heat flow). If a window's R-value is high, it will lose less heat. Conversely, if a window's U-value is low, it will lose less heat. Most window manufacturers use R-values in rating their windows. R-Values range from 0.9 to 3.0. U-Values range from 1.1 to 0.3. (Highly energy efficient exceptions exist.)

   Five factors affect the R-Value of a window:
   - The type of glazing material (e.g., glass, plastic, treated glass)
   - The number of layers of glass
   - The size of the air space between the layers of glass
   - The thermal resistance or conductance of the frame and spacer materials
   - The "tightness" of the installation (i.e., air leaks—infiltration, losses, seals, etc.). Casement & awning type windows with compression seals allow ½ as much leakage as double hung or slider windows.

2. **Visible Light Transmittance (VLT)** The measure of how much visible light comes through the entire window. The higher the number, the more visible light that gets in. A single pane of glass transmits about 92% of available visible light. A typical double-pane wood/vinyl window would have a total product visible light transmission of 57%. Use the VLT when comparing the energy performance characteristics of windows to make sure you're not sacrificing any more light than is necessary for a desired energy performance.
3. **Low-emissivity (low-e) glass** has a special surface coating to reduce heat transfer back through the window. These coatings reflect from 40% to 70% of the heat that is normally transmitted through clear glass, while allowing the full amount of light to pass through.
4. **Gas Fills** Many manufacturers are putting argon or krypton gas between glazing layers because these gases are less thermally conductive than air. Gas will not make a huge difference in a window's U Factor — window performance improves only about 5% to 10%. The real benefit of argon or krypton gas is in the colder climates where any possible improvement helps to reduce condensation.
5. **Warm Edge Technologies** Manufacturers use edge spacers to separate the multiple panes of glass. Traditional double-pane windows use aluminum tube spacers. Although these are structurally reliable, they are also heat conductive and; therefore, cause heat loss. In recent years, some manufacturers have begun to use materials and spacer designs that are less conductive such as Intercept, SwiggleSeal, and SuperSpacer. These newer "warm edge" spacers reduce condensation and ice buildup at the edge of the window.

Additional Considerations:

1. Window construction materials: Fiberglass, vinyl, wood, aluminum, etc. have unique variables.
2. Window coating options: Spectrally selective e-coatings, tinting, etc. related to window compass heading
3. Total damage weighted (Tdw)-reducing/measuring interior fading characteristics.
4. Solar heat gain coefficient (SHGC): Consider for window compass heading (Free energy gain and/or avoidance)
5. Warranty details such as transferability, coverage and length
6. Payback in energy savings. How will replacing windows lower home annual operating expense?
7. How to improve old/current windows without replacing them.

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