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Window Shopping

By Art Nash

Though windows take up a relatively small part of a home's overall wall space — or ceiling, in the case of skylights — they serve several important functions. So when shopping for windows, especially in cold climates, keep the following considerations in mind:

- How much radiant heat can pass into the house through the window?
- How much light can pass through, especially during the darkest months?
- What is the window's ability to retain heat?
- How much ventilation and what kind of ventilation will the window allow?

All of these are important considerations when shopping for windows, especially since one unit can cost hundreds or even thousands of dollars. There are some things you can do to improve the function of a window once it is in place, such as adding window quilts or clear film for insulation and shading to limit light and heat coming in. However, this publication is meant to help you choose the best possible windows straight off the shelf.

First Things First

Energy efficiency programs are offered in Alaska, and they include a beginning home assessment. Often, after various tools and calculations are used, professional weatherization staff will set out a plan for improving the energy consumption for a home, and very often one of the first recommendations is to replace windows, as it is a primary energy saving measure.

The first thing to look at when doing a window retrofit is the header blocking above the window space. It should be checked by a professional builder for structural integrity and examined for

mold or water damage; if any repairs are needed, they should be taken care of before installing any new windows into the same opening. When inset and secured properly into a wall, a window should close tightly in its frame. Watch for any "slop" when opening and closing it and look at the gasket or weatherstripping to make sure it is intact and properly aligned to create a solid seal when it gets closed.

Another thing to think about before you begin shopping is to look at how the old window was installed. Was the old window a casement window, set in flush to the opening with blocking used to set and secure it? Was the window in a jamb that was nailed into studs or headers? Was the window in a metal or vinyl frame that had a flange with screw holes that attached the window to the outside sheeting of the house, underneath the siding? These questions are important to keep in mind while shopping, along with the exact dimensions of the opening and size of the window.

Choosing the Window

Frames

First, take a look at the advertisement or brand label to see what type of material the window frame is made of. *Wood windows* are fairly straightforward. While they are the old standard, in humid coastal climates they can swell, and with high moisture levels they can also become moldy. *Vinyl windows* have become popular and they can be bought at big box stores. They come in different colors and are usually paintable. They often come in a sliding pane style, which is very popular. Over time, however, vinyl frames can become discolored and/or warp and flex with temperature changes. Still, they are usually affordable for the average homeowner. Then there are metal framings. *Aluminum frames* have been around for a while; they come in different colors and are relatively light in weight. At the very top end of the window spectrum are fiberglass windows, generally considered the Cadillac of windows. *Fiberglass frames* are smooth and very resilient, and in subarctic climates they remain tight (in low temperatures most materials contract, resulting in gaps). No matter what kind of frame you choose, examine the sash, or moving portion, to make sure it moves freely, but without any "slop."

Spacers

Spacers between the glass panes of a window have a big impact on the longevity and efficiency of the sealed glass unit. In modern windows, the glass panes act more or less as an argon-filled balloon.

It takes only one pin-hole leak in the sealing along the spacer to damage the gas buffer between glass sheets and cause the window to lose its ability to insulate.

Spacers keep the panes of glass apart and seal the window so that the insulating gas does not leak out, while fill-in sealants help prevent leaks along the spacers. Changes in outside temperature can cause spacers to either swell or shrink and this can cause them to break. The difference in swelling and shrinking among various materials of spacers is important since different materials expand and contract at different rates during temperature swings. Stainless steel spacers are less susceptible to this problem than other materials. Thermal expansion/contraction can also cause problems with the seals of vinyl windows. Wood windows are susceptible to both temperature changes and humidity. Fiberglass is not usually affected since it expands and contracts much less readily than vinyl, for instance.

Glass

Illumination and heat retention characteristics can be found for different types of windows. Labels stuck on the window glass will generally tell what type of glass it is; for a home, it should be tempered glass for lasting strength. The glass sheet may have a type of shading or tinting that reduces the amount of sunlight that is allowed in. Many windows come from the factory with a low-emissivity (low-E) coating. This coating lets in visible light and reflects heat back to the source. The low-E rating tells you to what extent certain wavelengths in the light spectrum are being allowed in. The lower the low-E rating, the better the insulating quality of the glass. This is especially important during winter months in cold climates, when it is important that radiant heat from inside the home does not escape to the outside. It is good to remember that you may want a different low-E value for windows on the north side of the home than on the south side because of the difference in sunlight exposure from north to south.

Product stickers on windows typically list the R-value, which is basically a number to use when comparing the ability to retain heat with other windows, your exterior doors and insulated walls. Recently, U-factors have been considered more

useful when comparing windows. The U-factor is the reciprocal of the R-value and is a measure of how well the window conducts heat. The lower the U-factor on the sticker, the higher the R-value and more efficient the window will be for keeping your home warm in winter.

Air space

Creating an air space or buffer between parallel sheets of glass can reduce the loss of heat from a home. A clear, inert gas injected between the panes of glass in a double-pane window can stop the transfer of heat and improve the passage of sunlight through the window — as long as the seal between the glass and window frame holds. Argon, sulfur hexafluoride and krypton all increase the R-value.

Even under stable conditions, a typical window with argon, for example, is expected to hold its gas for a bit less than a decade on average. If you see condensation between the panes, the gas has evacuated and the window insulation value is very minimal. Because you cannot adequately re-inject the window with gas, you should consider replacing the whole unit. Triple-pane windows are more expensive than double-pane windows, but if one gas chamber fails you have another chamber to provide insulation since they are independent cells. Some people use plastic sheeting that can be adhered to the outside of the inside frame and shrunk with a hair dryer to act as a "third" pane with the two sheets of glass in a double-pane window. Even though it is not filled with gas, it can improve insulation somewhat and prevent moisture glaciation on the window corners in cold weather.

Keep the gap between the clear sheet and the inside pane to half an inch or less to avoid circulation within.

Ventilation

How well a window ventilates will be somewhat determined by the material you choose and the style or shape of the window you choose. Shapewise, are you looking at a bay window, an arch or rectangular window? Sliding windows can be opened to various widths, allowing different amounts of air in. Awning-type windows are hinged at the top and open outward.

Awning windows and casement/crank-style windows leak less air than sliding or hung windows. Awning windows can be opened when it is raining

or snowing without moisture getting on the sill. Throughout Alaska, you can find a style of window that is hinged vertically as well as horizontally in the middle.

Conclusion

One of the biggest "frontiers" in window technology will most likely be the glass material itself. Spacers, framing materials and sashes are all using the best, most advanced building materials available at this point. Gas injection has also pretty much leveled out. To keep up on the latest trends in windows, go to https://buildingscience.com/. The Cold Climate Housing Research Center, www.cchrc.org, has information on windows and installation considerations for Alaska's cold regions.

Is it worth investing in more expensive energy-efficient windows? If you are building a new house, should you place energy-efficient windows on a south wall for solar gains or minimize the overall window area to prevent heat loss? These are the questions to answer while considering the window technologies available. Look at labels and ask vendors questions about each of the components in a window when choosing a product.

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