

WINDOW GLAZING

From ASHI@HOME by Carson Dunlop



Function of Windows

Windows allow light and ventilation into the home, and can provide emergency exits (means of egress). Although we are not required to perform code inspections, research into your local building code can provide you with these requirements. Windows can also add to the architectural appeal of the home. The topic of windows is extensive. We will limit our discussion here to the glazing portion of the window system, concluding our discussion with some of the conditions found with glazing and the process of inspection.

Materials

Window frames and sashes may be made of wood, vinyl (often polyvinyl chloride), metal (steel or aluminum) or fiberglass. Wood windows may also be vinyl-clad or metal-clad.

Glazing materials

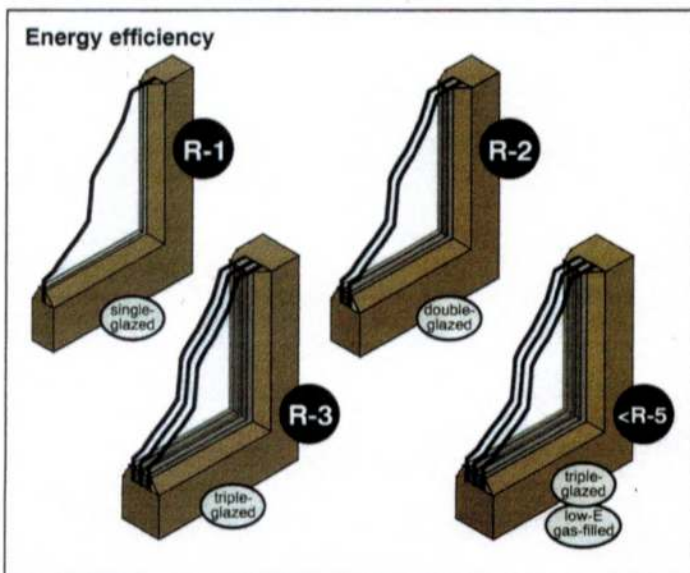
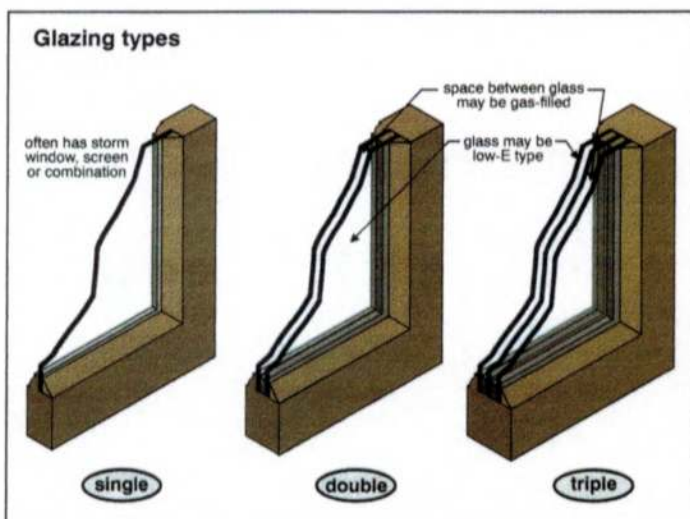
Conventional glass is the most common, although laminated, tempered and wired-glass may be found. Acrylic is common in skylights. Polycarbonates are used in windows where great strength and security are important.

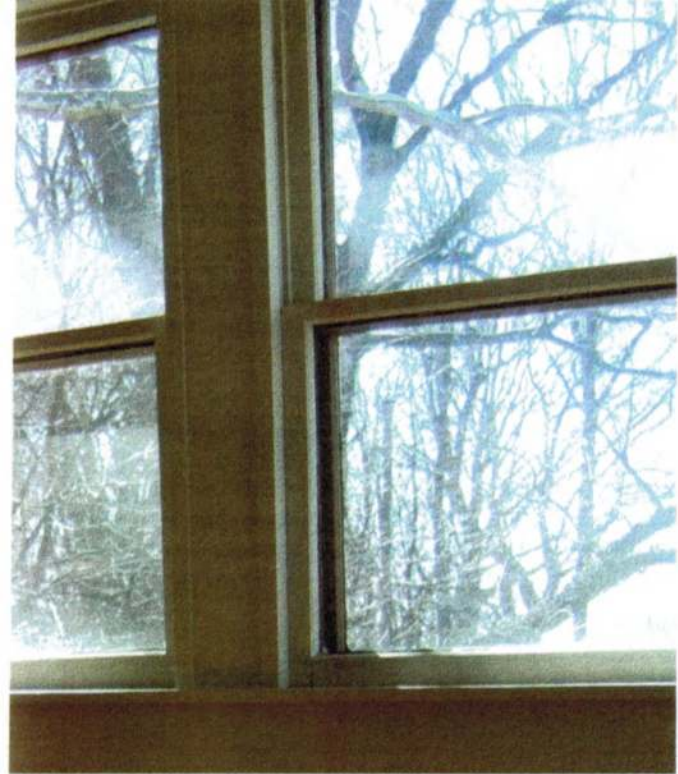
Glazing types

Windows may be single-, double- or triple-glazed. Single-glazed windows may have storm windows and screens. Double- and triple-glazed windows and skylights may have additional energy efficiency features, such as low-E glass and gas-filled spaces.

ENERGY EFFICIENCY

Considerable attention has been paid to the energy efficiency of windows in recent years. Let's put things in perspective. Current standards for wall insulation often call for R-values of approximately 20. A double-glazed window has an R-value of roughly 3, and a triple-glazed window has an R-value of roughly 4. Even with the highest energy improvement tricks, R-values of windows do not approach 5. Let's look at some of the ways that window efficiency can be improved.



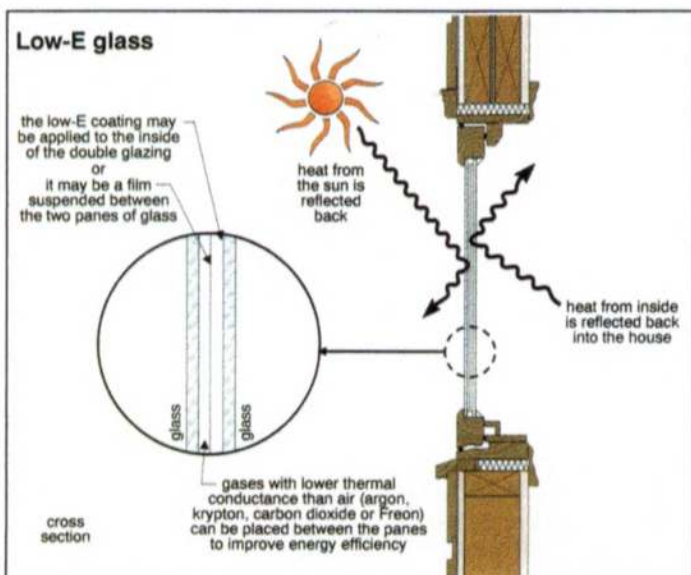


Low-E glass

Low-E glass uses coatings that reduce the emissivity of windows. The emissivity of a material describes its ability to radiate heat. A heat exchanger and conventional glass have high emissivity. Aluminum foil and radiant barriers have low emissivity.

Reduced heat flow

These low-E coatings reduce heat transfer through the window by reflecting heat. In colder climates during the winter, the heat is moving out of the house; the low-E glass reflects some of the heat back into the home. In the summer, the heat typically moves through the window from the outdoors in; the low-E reflects much of this solar heat back outside, helping with the cooling.



Metallic coating

The coatings are typically metallic and can be applied a couple of ways. The coating is on the inside of double glazing, so it isn't exposed to the air or elements. Low-E glass can also use a film suspended between the two panes of glass, effectively creating a triple-glazed system.

Blocks ultraviolet

Low-E glass has slightly less light transmission than traditional glass, although it's not usually noticeable. Low-E glass also helps screen out ultraviolet light, resulting in less fading of draperies and furniture, for example.

Gas-filled windows

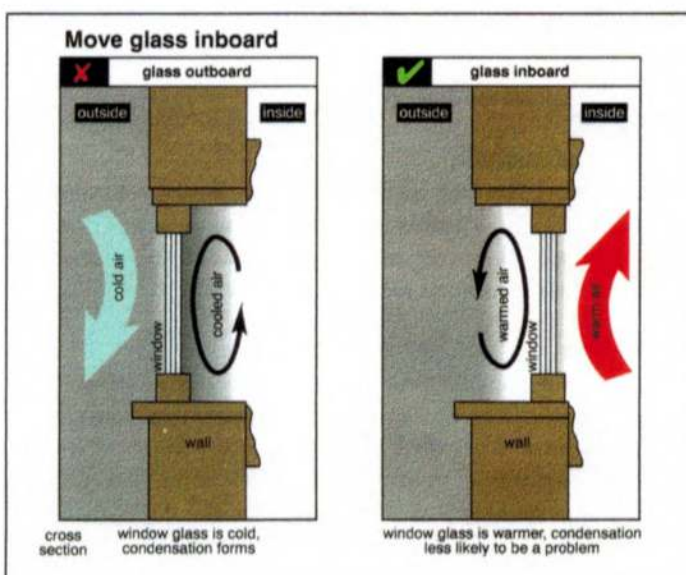
Conventional windows have air in the space between the glazing layers. Higher efficiency windows use heavy gases, such as argon, krypton, carbon dioxide or Freon®, for example, to improve performance. These gases have lower thermal conductance than air. These windows are tricky to manufacture because it's hard to keep air out of the space between the glazing. Over time, these gases dissipate along with the additional efficiency that they provide.

INSPECTION IMPLICATIONS

You won't usually know by looking whether the glass is low-E and whether the windows are gas-filled. It's not really a big issue for home inspectors, since conventional glass is not a deficiency. This is an upgrade that helps reduce heating costs, but is not a huge issue.

Move glass inboard

For cold climates, glass is better closer to the inner surface of a wall system than the outer surface. The glass stays warmer and condensation is reduced during the winter. Many windows have the glass substantially outboard.



Spacing between layers of glass

If the air space between panes of glass is too small, there will be conductive heat loss through the window, and the advantage of double-glazing will be substantially reduced. If the air space is too large, convective loops will be set up and, again, the advantage of double-glazing will be lost. The optimum air space appears to be about five-eighths of an inch. Common gaps are roughly one-half inch, which is close to the optimum spacing.

COMMON ISSUES WITH WINDOW GLAZING

Let's now have a look at some common conditions with window glazing. The glass may:

- Be cracked
- Be broken
- Be loose
- Be missing
- Have a lost seal
- Have excess condensation

Causes

These window problems are usually maintenance related. Lost seals may be the result of a manufacturing defect. Excess condensation on windows is usually a lifestyle and air quality issue.

Implications

Cracked, broken, loose or missing glass can be both a heat loss and heat gain problem, and can create a risk of injury. If the glass is loose, it often rattles whenever someone walks through a room. People may be cut on broken glass.

Lost Seals

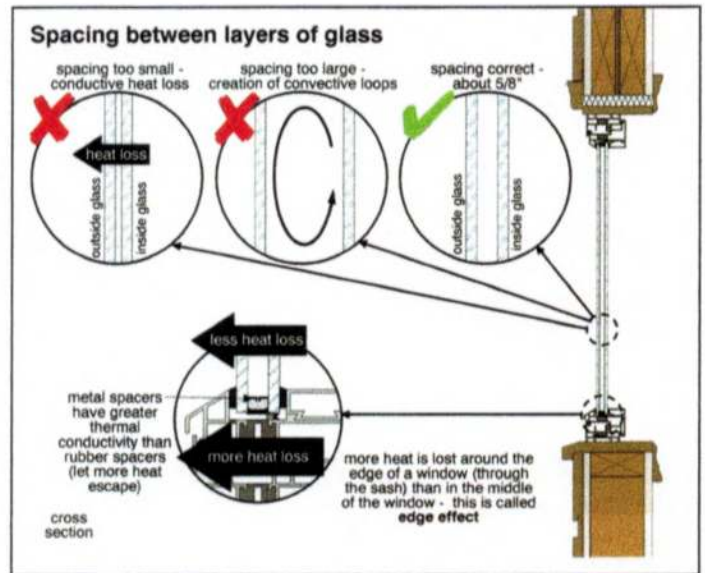
Lost seals are not particularly serious from an energy efficiency standpoint. The window will still perform reasonably well. However, visibility is often reduced and the glass may look cloudy, even if there is no condensation present at the moment. Once the seal is gone, condensation will appear and disappear between the panes. This, however, leaves the interior surfaces of the glazing dirty and the cloudy appearance develops.

Excess condensation

Excess condensation will usually only occur during cold weather. It is the result of high humidity levels in the house as well as a cold window surface. Eliminating moisture sources and using exhaust fans are obvious steps to control indoor moisture levels.

Conclusion

We have briefly introduced the topic of window glazing and outlined two of the common conditions found during home inspections. More information on other conditions related to glazing is discussed in detail in the ASHI@HOME training program. There are also in-depth discussions on all aspects of window systems and their conditions, causes, implications and strategies for inspection. ■



Lost seal resulting in condensation between the panes.



Excess condensation resulting in moisture accumulation at interior window sill and casing.

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