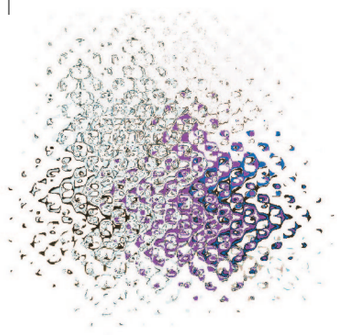

Low-E glass: picking the right type

To find out which low-E glass offers the best performance, it is crucial to look at both the heat transfer coefficient and the solar heat gain coefficient, based on the local climate.

HOMEOWNERS, BUILDERS AND architects choose to use low-E glass in their windows for one reason: energy efficiency. Of course, low-E glass brings other benefits such as increased comfort and condensation resistance, but the primary function is improved energy efficiency – whether the driving force is to meet building codes or to reduce utility costs. However, those who use low-E glass must be careful in their selection, as not all low-E glass is the same.

The impact of sunlight

All low-E glass improves the insulating value of the window in basically the same way. A thin coating based on either silver or tin oxide is deposited on the glass. This coating transmits visible light, but reflects longer wavelength infrared light associated with radiative heat emitted by all warm objects. By reflecting this radiative heat back into the room, the coating reduces heat loss from the building, resulting in a lower overall heat transfer coefficient (U or K).

Because of its relative simplicity, there has been a tendency to compare only the U value for different windows and glazing options, just as one would do for wall insulation. However, it is inaccurate to treat a window as if it were an opaque wall, ignoring the effect of sunlight coming through the window. Sunlight is a significant source of free energy into the building, which can be either beneficial or detrimental, depending on the building location. Thus, to accurately evaluate window performance, the solar heat gain coefficient (SHGC or g) must also be considered, as its impact on energy consumption can be the same or even larger than that due to the U value. For this reason, modern window rating programmes such as the European Window Energy Rating System (EWERS) and performance-based building codes are moving away from considering only U value to formulas including both U and SHGC.

Comparing performance

Those who use low-E glass must be aware of both properties, because although all low-E glass will have a reduced U value, different products can vary widely in actual performance by having either high or low solar heat gain. In warm climates, where energy consumption is dominated by air conditioning, windows with low solar heat gain are preferable to reduce cooling demand. In colder climates where heating is the major concern, high solar gain windows are preferable, as they let in the free energy of the sun to reduce heating fuel consumption. Special care must be taken in cold climates, because as the U value is reduced, the solar heat gain is reduced even further for many coatings. Therefore, although a low-E glass with a very low U value appears to be the best choice, it may actually have worse performance if it has low solar heat gain that blocks the warmth of the sun and increases heating requirements.

For example, the energy rating of an insulating glass unit (IGU) with U=1.1 W/m^{2}K and SHGC=0.30 is actually worse than an IGU with U=1.6 W/m^{2}K and SHGC=0.55 for typical homes in the UK and Denmark, despite the lower U value. The improved insulating level is offset by low solar heat gain, which reduces the benefits of passive solar heating.

In conclusion, it is not enough to only look at U value when selecting low-E glass. The solar heat gain, which can vary widely between products, must also be considered, based on the local climate. Window rating systems that include both U and SHGC in a simple energy rating, such as EWERS, are useful tools in making this decision. ▮

Authors & Company Profile

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