

Fenestration

Low-Emissivity Clearing Up Low-E Glass Confusion

by Larry Wachtel, CSI, CDT, JELD-WEN Windows & Doors

(Editor's Note: Larry Wachtel serves as a JELD-WEN architectural consultant, covering the Northwest, Alaska, and Hawaii. He is on the board of the AIA chapter in Portland, Oregon, and has 25 years' experience in the window and door industry.)



Not all low-e glass coatings are created equal, nor is today's low-e coating the same as it was as recently as two or three years ago. Advances in glass coating technology and stronger regional energy code requirements have helped create a new generation and more sophisticated array of low-e glass options. Choosing the best option for your next project can be compared to pairing the perfect wine with your entrée at a new restaurant.

So how do we know which low-e is best suited for that next project? Let's begin by understanding just what it is, and how it works. Low-e, meaning "low-emissivity," is an extremely thin layer, or more commonly several layers, of metallic particles applied to the glass which, in simple terms, allows the glass to act like a sieve. Long wavelengths, or heat, are filtered out, while short wavelengths (the visible light spectrum) are allowed to pass through.

However, today low-e means much more. By changing the types of materials

used in the "stack" or layers of low-e, or by increasing or decreasing the number of layers, we can now get more specific in choosing glass that will meet our exact project needs. Need high visible light but low U values? There's a low-e for that. Need greater protection from fading? There's a low-e for that. And it can get even more precise. Adding argon gas to the captive air space between glass panes will improve insulating value. Adding various tinting agents to the glass itself will allow for even further refinement of the glass' performance.

Different Than Tinting

Low-e is not the same as tinted glass. Tinting is the adding of alloying materials to the glass itself. The depth of color of tinted glass will change with glass thickness, so that a sheet of 3mm glass will have a lighter tint than that of a sheet of 6mm glass. Small windows next to large fixed units or doors can have different tints, since the standard glass thickness of smaller panes is typically thinner than that of larger ones. Low-e, on the other hand, is applied to the glass, and therefore will have a similar appearance regardless of glass thickness. Also, tinted glass tends to absorb sunlight and will get very hot when installed as a single pane, hence tinting does not improve insulating value.

Controls Solar Heat Gain

Solar Heat Gain Coefficient (SHGC) can also be controlled by the use of low-e coatings combined with the use of tints, and

can even be influenced by the glass surface the coating is placed upon. Additionally, since less than half of the total solar energy spectrum is visible to the human eye, solar performance of glass can be visually deceptive.

Darker tints don't necessarily mean significantly better SHGC values. For instance, green tinted glass will allow 77% visible light transmission, while gray glass only allows 45%, yet the gray glass only improves SHGC by 2%. A better way to improve SHGC, without compromising visible light transmittance, is through SHGC-specific low-e coatings. The accompanying graph compares clear, tinted, and other low-e options from a main glass supplier, Cardinal Industries.

Comfort level

Perhaps one of the least-often discussed elements regarding glass performance is the comfort level of occupants. If the inside glass temperature of an insulated unit is significantly lower than the room temperature, it can give the occupants a feeling that the room is colder than it actually is. For example, at 0° outside, the inside surface of double-pane glass can be as much as 30° warmer than single-pane glass, but still 25° lower than low-e coated glass. The converse can be true during hot summer months. Low-e has the ability to keep the temperature of the surface of the glass facing the interior very near that of the room itself, regardless of outside temperatures. Low-e2 glass can keep the inside glass temperature within 1°F of a room with no windows.

