Energy efficient windows: An introduction

Going GREEN is a major trend at the moment and having energy efficient windows in your home is quickly becoming a must-have for many people.

Not only is the "green" movement near the top of many political agendas, its presence is often seen throughout the mainstream and minor media. The bottom line is this: green sells and going green is cool.

The trend is positive. With energy costs reaching new heights, we need to be proactive and intentional. We should not only reduce the amount of energy we use, but also conserve the energy we don't. Since nearly 15-20% of all home energy is lost via windows and doors, having energy efficient windows in your home should be a priority.

The focus of this introduction is to help explain (without getting too technical) the current energy ratings scheduled to today's energy efficient windows. These ratings are crucial in making informed decisions regarding the purchase of energy efficient windows for new home construction or replacement.

With the green trend gaining momentum, an informed decision concerning one of the most critical areas of energy loss (or conservation) in your home is paramount.

Insulated Glass: (IG)

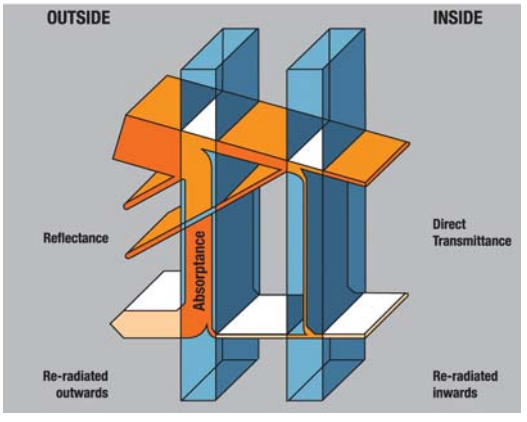
Two or more individual panes of glass separated by a specified spacer bar system and then sealed to be air and water tight. The "captured" airspace between the panes of glass forms the insulating barrier. The majority of modern energy efficient window systems utilize some type of safety insulated glass unit (SIGU) application.

Emissivity

Emissivity is the capability of a surface to emit heat radiation. A black surface is often used as a constant in measuring other surfaces against it.

For example, in measuring the emissivity of a particular IG unit, the IG unit is placed next to a solid black surface and subjected to an identical heat source. Measurements of heat radiated from each surface are then taken. The lower the number results in better heat-reflecting capability.

With relation to energy efficient window systems, lower emissivities are desired.



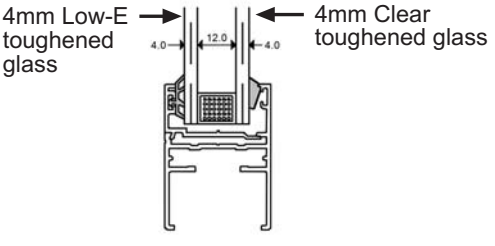
Reflectance
The proportion reflected back in the atmosphere.

Absorptance
The proportion absorbed by the glass.

Direct Transmittance
The proportion transmitted directly through the glass.

Total Transmittance
The proportion transmitted through the glass by all means.

Clear glass behaviour Heat absorbing glass. Heat reflecting glass.
(also known as g value or solar factor).



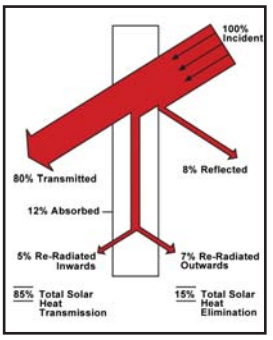
OPTIONAL
DOUBLE GLAZING DETAIL

U-Value: (and its relation To R-value)

U-Value is the measure of a window's ability to reduce heat loss during indirect radiation exposure; such as during the winter months in moderating climates. Lower U-values translate into less indirect heat lost from the interior of the home resulting in lower heating costs.

U-value is the inverse of R-value (a more common term used in the insulation business). To find a correlating R-value from a given U-value, simply divide the number 1 by the U-value. Lower U-values correlate to higher R-values. For example: 1 divided by a .50 U-value gives us an R-value of 2.00.

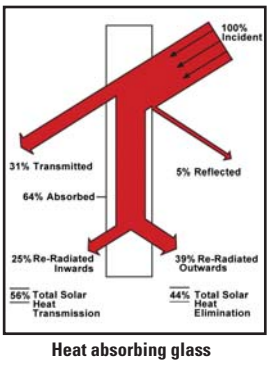
So, even with the large disparity between the wall vs. window insulating factor, improving U-values greatly increases the energy efficiency of the home.



Clear glass behaviour

Solar: Heat Gain Coefficient (SHGC)

Solar Heat Gain Coefficient (SHGC) is a measure of a window's ability to reduce heat gain during direct radiation exposure; such as during the summer months in warmer climates. A lower SHGC translates into less direct heat being pulled into the home resulting in lower cooling costs. SHGC and U-value are closely linked since the lowering of one directly affects the other.



Heat absorbing glass

Low Emissivity: Low-E

Low-E refers to the ability of an IG unit to suppress direct heat radiation and absorb indirect heat radiation. By placing a Low-E coating, which usually consists of a microscopically thin layer of metallic oxides (primarily silver), on a glass surface, the ability to transfer heat radiation is lowered. The heat remains on the side of glass where it originated.

In a nutshell, Low-E coatings reflect direct heat radiation and absorb indirect heat radiation

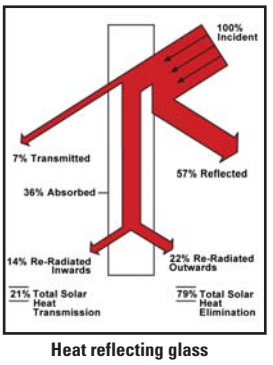
How does Low-E work?

Low-E glass works based on the angle of direct solar radiation.

Due to the sun's differing angles at various times of the year, Low-E coatings work well in all seasons. In summer, when the angle is more direct, or "a high sky" they reflect heat. In winter, when the sun's angle is less direct, "a lower sky" they absorb the indirect heat.

Referring back to the previous demonstration, the non Low-E coated glass allowed the direct heat to pass through the glass thereby warming your interior glass.

The Low-E coated glass, on the other hand allowed some of the indirect heat in but blocked the direct heat thereby keeping your interior surface of glass cooler.



Heat reflecting glass

Sealed Insulating Glass Units

With ever-rising energy costs and impending government legislation, sealed insulated glass units are becoming more and more essential to any building. By trapping a layer of dry air between two glass panes, thermal resistance is naturally increased and heating and cooling costs reduced.

Condensation Eliminated

The tremendous insulating properties of dehydrated air in the SIGU's ensure the inner pane is at virtually the same temperature as the room, thus largely eliminating condensation.

Reduced Noise Levels

Generally, SIGU's offer approximately 20–30% improvement in sound control over a single glazed window, dependant on glass selection.

How Glass Can Provide Solar Control

Solar control can be achieved in a number of ways, including Low-E tinted glass, coated glass and laminated glass.