



# PILKINGTON

## Technical Information

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### How Pilkington Energy Advantage™ Low-E Glass Works

Low-E coated glass works in 2 ways: First, it easily transmits the sun's energy because the coating is transparent to this range of radiation (350 to 2500 nm).

Second, the Low-E coating has a greatly reduced absorption and greatly reduced emission of long-wave radiation (3 to 50 micrometre also called Far Infra Red (IR) ) compared to uncoated glass which is opaque to long-wave radiation and is highly absorptive and highly emissive at these wavelengths.

A room at 70° F radiates energy in the far IR (maximum radiation at around 10 micrometre). Uncoated glass readily absorbs this energy, heats up and radiates to the cold exterior in winter. Low-E coatings, because they are electrically conductive reduce the transfer of this long wave IR energy. (Pilkington **Energy Advantage™** Low-E glass has a doped tin oxide coating to make it conductive).

If the coating is on the 3<sup>rd</sup> surface (the exterior side of the room-side light) of a two light insulating glass (IG) unit, it cuts the radiant heat loss to the cold exterior by reducing the radiation or emission, to the exterior, of the energy absorbed from the room.

If the coating is on the 2<sup>nd</sup> surface of an IG unit, it controls the winter heat loss by reflecting the long wave IR, coming from surface #3, back towards the room. A coating such as Pilkington **Energy Advantage** Low-E with an emittance of 0.15, has an IR reflection efficiency of 85%, as compared to uncoated glass with only 16%.

The thermal insulation effects of the coating on either #2 or #3 surfaces are identical for winter nighttime heat loss.

It should be noted that heat flows from hot to cold objects. The sun is hot and so its radiant energy will shine into a room in both summer and winter. In winter this absorbed radiant solar energy will then radiate out to the cooler exterior, creating heat loss and high heating fuel charges. Low-E coated glass will reduce this heat loss. In summer, when it is hot outside, a small amount of heat also comes into a room by long wave IR radiation from the hot exterior environment to the cooler interior. Low-E glass will reduce this unwanted radiation heat gain.

Finally, the much-quoted greenhouse effect should be carefully understood: A greenhouse with uncoated clear glass gets warm only because the absorbed solar radiation within the enclosed space is prevented from escaping by the presence of the glass which blocks air convection currents to the exterior environment. (The radiative heat transfer mechanism from the warmed material in the greenhouse to the cool exterior is hardly altered by the presence of a single light of clear glass.) The use of Low-E coated glass in a greenhouse creates warmer temperatures within because the heat loss of the passive solar gain is inhibited in both the convection and radiation transfer mechanisms.

The information contained in this bulletin is offered for assistance in the application of Pilkington flat glass products, but **IT DOES NOT CONSTITUTE A WARRANTY OF MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE.** Actual performance may vary in particular applications.

