Technical Bulletin

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How Pilkington **Solar-E™** Solar Control Low-E Glass Works

Summary

Pilkington **Solar-E**™ Solar Control Low-E coated glass is designed to transmit the maximum possible amount of visible light, absorb and reject the maximum amount of solar infra red energy, and reflect the maximum amount of long wave (room temperature) infra red energy (far I.R.), all with a hard, durable pyrolitic coating.

Detail

Pilkington **Solar E**™ works year round to save energy in 2 ways:

- During a summer day, the coating absorbs nearly half of the sun's energy shining onto it. This absorbed energy, which heats the glass, is restricted from passing on into the building by the low emissivity property of the Pilkington **Solar E**™ coating which only radiates long wave infra red heat with 15 % efficiency, as compared to non-coated glass which radiates with 84% efficiency. For this effect to take place the coating needs to be on the #2 surface of the glass, whether it is single glazed or in a sealed double glazed insulating glass (IG) unit. (Note: Glass surfaces are conventionally numbered, starting at the outside, with surface #1. Rain falls on the #1 surface.)
- During the winter heating season, a room at 70 °F radiates energy in the far IR (maximum radiation occurs at around 10 micrometer wavelength). A non-coated glass surface facing a warm room readily absorbs 84% of the radiant heat that is directed towards it. The glass becomes warm and then re-radiates this absorbed heat on out towards the cold exterior. A Pilkington **Solar E**™ low emissivity coating, on the #2 surface of single glazing or of an IG unit, only absorbs 15 % of this valuable room heat. The balance of 85% of the radiant heat is reflected back towards the room and so significantly reduces overall the heat loss.

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If a low emissivity coating is on the #3 surface (the exterior side of the room-side light) of a double glazed insulating glass (IG) unit, with a solar absorbing tinted outer light, the coating will cut unwanted incoming long wave radiant heat from the hot, tinted outer light by reflecting it outwards with an 85% efficiency. This improved performance is seen in the lowered SHGC value.

Pilkington **Solar E**™ is not normally glazed with the coating on the #3 surface with a clear, outer glass. This assembly would trap the sun's heat and drive it inwards, resulting in a high SGHC value. It would also have a high risk of breakage from thermal stress in the room-side light.

A low emissivity coating reduces the IG U-Factor and thus the winter night time heat loss to the cold exterior by exactly the same amount with the coating on either #2 or #3 surface. 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. In summer, when it is hot outside, a small amount of heat also comes into a room by conduction from the hot exterior environment to the cooler interior. Low- emissivity coated glass, having a lower U-Factor or conductivity, will reduce this unwanted heat gain with the coating on either #2 or #3 surface of an IG unit as compared to uncoated clear glass. The lower SHGC (Solar Heat Gain Coefficient) of Solar E Glass as compared to clear, un-coated glass, shows the significant reduction in heat gain from direct solar radiation on the glazing.

The net result is that there is less overall solar heat gain with Pilkington **Solar-E**™ Glass. In winter, while there is less beneficial passive solar gain by day (if passive solar gain is wanted then Pilkington **Energy Advantage**™ Low-E Glass should be used), there is also less heat loss by day and by night from conductivity as compared to clear, un-coated glass. This results in year-round energy savings being achieved.

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