

## The “Technical” Bit

### Heating & Cooling Insulation

To better understand the process of window insulation the following thermodynamic principles are relevant:

1. Convection is the movement of air circulation caused when warm air rises and cool denser air falls.
2. The convection process is reduced when a narrow airspace is put between the two air movements. The narrow airspace increases the drag between rising and falling air. The net result is that the air falling down the window is not cooled to the same extent, as it would be if it came in direct contact with the cold external glass.
3. Conduction is the process by which heat is directly transmitted through a material when there is a difference of temperature. Glass is a very good conductor of heat and hence cold.
4. Warm air can ‘hold’ more moisture as water vapour than cold air can.
5. Dew point is the temperature, at which a given parcel of air must be cooled down (at constant barometric pressure) for water vapour to condense into water droplets. Often referred to as dew or condensation.

### Convection & Conduction

When we heat the air in our homes, the warm air rises straight to the ceiling. This rising air displaces other warm air near the ceiling, which then slowly sinks as it cools, travelling down the walls. When the air travelling down the wall passes a cold window, conduction occurs causing the warm air to be cooled as it passes the cold pane of glass. This cooled air can then fall even faster and often causes a draught effect at the bottom of the windowsill that results in cold spots being felt within the room. This cycle will continue to pull warm air against the window establishing a convection current that will cool your room throughout the day and night.

Ecoglaze Secondary Glazing significantly reduces the rate of heat loss because the insulating airspace between the two surfaces is less prone to convection and conduction. An Ecoglaze window will still cool the internal falling air but the conduction process is greatly reduced.

Ecoglaze uses acrylic and not glass because of its superior insulating properties. Acrylic can prevent the transfer of temperature five times better than glass. This is why under similar conditions on a cold day glass will be a lot colder to the touch than acrylic.

# What are U and R-values ?

They are values used to indicate the energy efficiency of materials with regards to heat loss. A U-value is the amount of heat transferred or conducted through a material and an R-value is the resistance of heat flow through a material. They are essentially two sides of the coin; one is the inverse of the other. R-values are used to rate walls and ceilings and are applied to individual materials such as insulation batts and gypsum board. R-values do not translate well to windows and other fenestration products. That is why windows are best measured in U-values because they can rate the energy efficiency of the combined materials in a building component or the entire assembly including the airspace.

The lower the U-value, the better the insulating performance will be.

Single glazing typically has a U-value of approximately 5.8, double glazing starts at 3.14 and decreases. Ecoglaze has been calculated to have a U-Value of 2.7, lower than many types of double-glazing. This means Ecoglaze can achieve up to 54% less heat loss through your windows if applied to single glazing.

Ecoglaze works just as effectively in a cooling climate as it does in a heating climate. It can prevent the heat from coming in on a scorching hot summers day making your home more comfortable and reducing the air conditioning costs. Alternatively in winter it will still let as much of the sun's energy through the windows but trap and stop the warm air from escaping on the cold evenings. Depending on the climate zone and surrounding geographical environment in which you live, energy savings achieved by Ecoglaze Secondary Glazing will vary. So not only will Ecoglaze reduce the energy bills within your home, but another important factor to consider here is the extra comfort and wellbeing secondary glazing will bring to your living environment.

As mentioned earlier, warm air holds more moisture than cold air. As the falling warm air in a room cools a dew point can be reached.

This will result in the water vapour condensing into water droplets and forming on cold surfaces such as glass. This is referred to as condensation.

This wet, unhealthy environment can encourage the growth of mould and mildew on the windowsills causing deterioration or rotting. Mould can then spread and appear on wallpaper, curtains and ceilings. These sorts of conditions are not only unsightly but can be detrimental to the health of the occupants living within that environment especially if this process occurs day after day during winter. Greatly decreasing the condensation creates a drier and healthier home in which to live.

Ecoglaze Secondary Glazing greatly reduces the volume of condensation occurring and that's got to be better than mopping it up every morning!

## Looking after your Ecoglaze panels

Acrylic panels should be cleaned using either warm soapy water or a mild furniture polish (without alcohol) applied with a soft cloth such as microfibre. Do not be tempted to use chemical cleaners as this may affect the surface of the sheet.

## Why do we use acrylic instead of glass?

Acrylic has much better insulation properties than glass.( see U value above)  
Acrylic is also around 20 times the impact strength of glass and considerably lighter. It is thus much safer.