

# Energy Efficient Glazing

**The Energy Managers' Guide to Energy Efficient Glazing provides some basic information on the glazing within buildings; explaining the key features to understand and what can be done if the glazing is not working for you.**

Where to start - some questions to ask yourself :

1. Do you know what the glazing within your building is and how it operates?
2. Does the glazing work for your business and members of staff? If not why not?
3. Do you understand about the safety requirements of the glazing in your building?

Glazing Technology - Background  
The external envelope to your building (roof, walls, windows, doors and floor) provide an essential function to keep the weather out of the building and to maintain a comfortable environment for the occupants. If the envelope has a good thermal efficiency this will mean the amount of energy needed to heat or cool the building will be reduced. This will provide cost savings to the occupants as well as reducing the impact on the environment and the amount of CO<sub>2</sub> produced, which improves your green footprint.

External glazing provides a unique function to the envelope to your

building - good glazing can provide a fantastic environment for the users of the building - ensuring it is a comfortable environment (not too hot or too cold) and has natural lighting (for better health and wellbeing of occupants).

There are two key elements to glazing and its function within the external building envelope - thermal heat loss and solar heat gain.

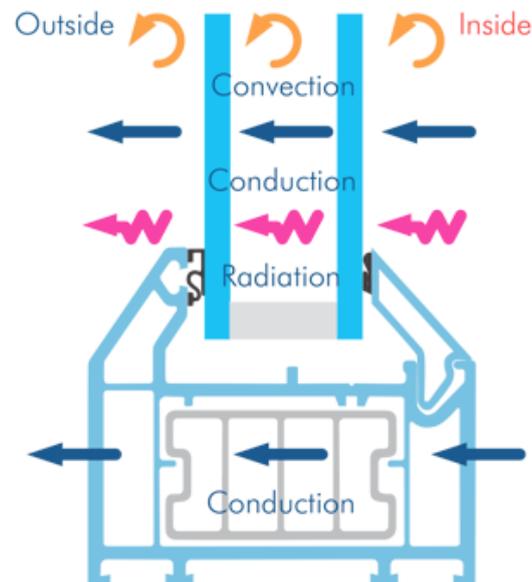
## 1. Heat loss

The heat loss is by convection, conduction and radiation - the 3 ways heat moves from within the

building to the outside. This is measured by the U value of the glass, this will vary depending on the glass type and combination, typical values are:

- Single-glazing 5.0 W/m<sup>2</sup>K
- Double-glazing 3.0 W/m<sup>2</sup>K
- Triple-glazing 2.2 W /m<sup>2</sup>K
- Double-glazing with low-e coating 1.7 W /m<sup>2</sup>K
- Double-glazing with low-e coating and Argon filled 1.3 W / m<sup>2</sup>K
- Triple-glazing with multiple low-e coatings and Xenon filled 0.4 W/ m<sup>2</sup>K

## Thermal losses (Negative)



Thermal losses from convection, conduction and radiation

The lower the U value the better the thermal performance and less heat is lost from the building.

## 2. Solar heat gain

The solar heat gain is measured by the g value (this is the coefficient of the permeability of total solar radiation energy stated as %). This is composed of the direct transmission of energy and the secondary dispensation of heat of the glazed surface toward the interior, which occurs on the basis of absorbed solar rays. The sun can heat a room only by glass and thus also contribute to heating without any additional expenses; however what is welcome in winter can be unpleasant in summer, because gaining energy through solar radiation means heat.

The correct course is high thermal insulation, which means a low U value combined with a g value that is not too high.

So with the basic physics of heat loss and gain, if the correct glass is used an optimum environment can be achieved. However, life is not that simple!

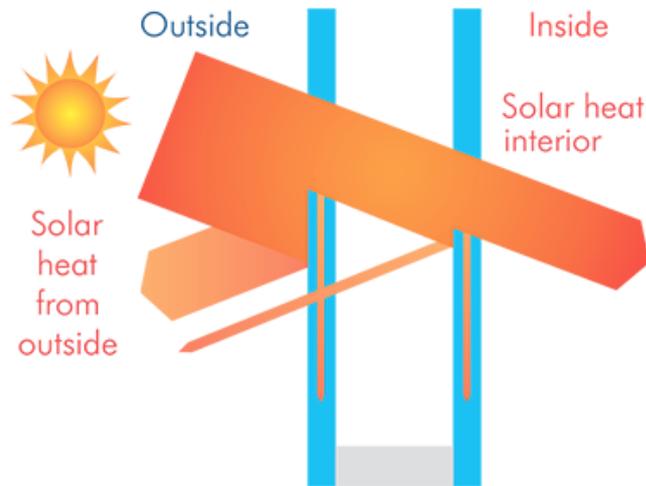
Other things to consider

- Orientation of the building and facade - the north side of a building will gain considerably less solar energy than the sun-exposed south; likewise morning sun on the East elevation and evening sun on the West can have an impact on the building.
- The building's heating, ventilation and controls systems.
- External shading devices.
- Internal shading devices (however, excessive heat has already entered the building)
- Use of the building - number of staff, what are they doing, what machinery are they operating.

### What do I do if the glazing is not correct for the building?

If you are undertaking a building refurbishment program you might want to consider replacing the glazing systems to more energy efficient products which are available today.

## Solar heat gain (Positive)



Solar heat is reflected, absorbed and transmitted

If you do not have the budget to undertake this you may wish to consider the use of Adhesive Backed Polymeric Window Film (known as Window Film) to the glass to change the heat loss and solar gain. Window Film can enhance your energy efficiency and provide thermal comfort.

Over the past twenty years the UK has had a 60% increase in air conditioned buildings. Cooling

a building with the use of air conditioning often uses a lot more energy than heating the building. This is without allowing for the extra energy used by new technology systems, often found in homes and working environments.

As companies make changes to improve their energy efficiency, window film is becoming one of the key options. Window film is a retrofit layer applied to the internal



or external surface of existing glass, designed to enhance the performance of windows by reducing solar heat gain and glare. With the global shift towards a greener way of thinking the members of the Window Film Group of the Glass and Glazing Federation consult with companies in their drive to reduce their carbon emissions along with their carbon footprint and energy costs. With the correct film installed it is possible to cut cooling loading by up to 30%.

**Window film**

When applied onto existing glass, it will help balance the temperature, minimising hot spots within the building. Window films can also provide the benefit of excellent glare control for screens, reduce the fading of interiors and with combination film can enhance the glazing to create blast mitigation.

Adhesive backed polymeric window film is a high clarity polyester film that has been designed for application to glass to improve its performance.

It is a glass treatment that can be professionally applied either in the factory to new glass or in situ to existing windows, glass doors and partitions.

The correct application of film onto glass can upgrade the original glazing to meet the requirements of Building Regulations, Health & Safety Regulations as well as British and European Standards.

**Types of Window Film**

**- Safety Film**

When applied this type of film will transform ordinary annealed glass into a safety glass that can be

classified by EN 12600.

**- Security Film**

This type of film can enhance the performance of glass with respect to:

- Resistance to manual attack;
- Resistance to explosive pressure;
- Resistance to ballistic attack spall reduction

**- Solar Control Film**

When applied this type of film will modify the spectrophotometric properties of the glass. These films can be coloured and/or highly reflective. They can also have low emissivity.

**- Low Emissivity Film**

When applied this type of film will reduce the thermal transmittance (u value) of the glass.

**- Others Specialist films**

Special Ultra Violet Reducing film; RFI/EMF Shielding Film; Privacy Film; Decorative/Manifestation Film Anti-Graffiti Film Adhesive backed polymeric film should comply, in the future, with prEN 15752-1.

Window Film is an additional coating added to existing or new glazing systems to enhance them in a vast number of ways.

These include:

- Energy and CO2 Reductions, including reduction of air conditioning use.
- Improving thermal comfort by reducing solar heat gain and winter heat loss.
- Compliance to Health and Safety Regulations.
- Reducing the effects of an explosion including terrorism.
- Improving safety against other Glass related situations including Spontaneous Breakage.
- Reducing the effects of the Sun including UV protection against Skin Cancer and Fading

The full version of the Energy Managers' Guide to Energy Efficient Glazing is available on the EMA website in the Resources section.

The EMA wishes to thank the Glass and Glazing Federation (GGF) for their support in producing this guide.

