Insulated glazing

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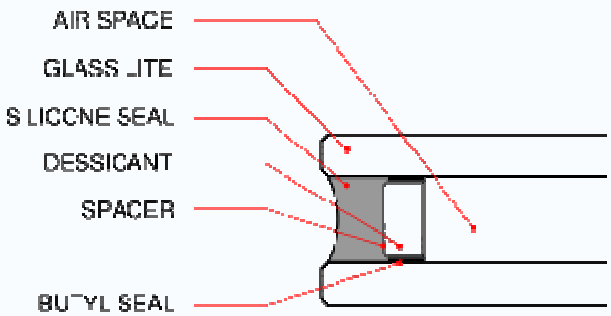
Insulated glazing unit (commonly referred to as **IGU**) is a piece of glazing consisting of two or more layers (lites) of glazing separated by a spacer along the edge and sealed to create a hermetically sealed air space between the layers. This provides better heat and sound insulation than standard single-glazed windows.

Insulating windows are usually double paned and are also referred to as "double glazing" but windows with triple panes or more, "triple glazing" are sometimes seen in very cold areas. Insulated glazing is framed in a sash or frame as if it were a very thick piece of glass.

Insulated glass



EDGE OF A TYPICAL IGU

IGU made of glass is called insulated glass (which refers to heat insulation, not sound. A more technically correct term, though, is insulating glass, since the glass itself has no insulative properties. It is actually the air space between the glass layers (lites) that provides the insulative qualities.

The air space between the lites may be filled with air or an inert gas like argon or krypton which would provide better insulating performance. Argon (Ar) has an atomic mass of 39.9, which is much more than nitrogen (N_2) and oxygen (O_2) molecules, which have a molecular mass of 28.0 and 32.0 respectively. As a result, argon atoms move significantly slower than nitrogen and oxygen molecules at the same temperature. This reduces convection and decreases the energy transfer between one side of the glass and the other. Typically the spacer is filled with desiccant to prevent condensation and improve insulating performance. Less commonly, most of the air is removed, leaving a partial

vacuum, which drastically reduces heat transfer through convection and conduction. This is called evacuated glazing.

Often the insulating quality is used in reference to heat flow where the gap between glazed sheets is optimum at about one centimetre. A larger gap allows for convection currents and negates the dead air space. However, in some situations the insulation is in reference to noise mitigation. In these circumstances a large gap improves the noise insulation quality or Sound transmission class.

Insulated glass may not be cut to size in the field like plate glass but must be manufactured to the proper size in a shop equipped with special equipment.

Glass coatings

The heat and sound insulation of glazing may also be improved through the use of a film or coating applied to its surface. This film is typically made of polyester or metal, and may give a reflective appearance and one-way mirror effect to the window, and may improve both heat and sound insulation. This may be used on single-glazed windows as an alternative to insulated glazing, or on the outside layer of insulated glazing to further improve its effectiveness. Such coatings may reduce fading of fabric and improve safety in the case of breakage.

"Secondary glazing" is sometimes used as a cheaper alternative. This consists of a layer of glazing placed retrofitted inside the window, to provide sound and heat insulation. Plastic sheet may be used for heat insulation, but may only last for one season.

Low-emissivity coating

Low-emissivity (Low-E) glass has a thin metal coating on the glass within its airspace that reflects thermal radiation back into the interior, and allows solar radiation into the room. Thus, the coating helps to reduce heatloss but allows the room to be warmed by any sunshine.The low-e coating is on the inside pane of glass, if solar control is required then the outside pane of glass would have either a film or a body tint to reflect solar radiation.The principle is similar to a Dewar flask, in which the metal is in contact with a near-vacuum, greatly reducing the conduction and convection that would normally occur while taking advantage of the metal's superior radiative properties.