



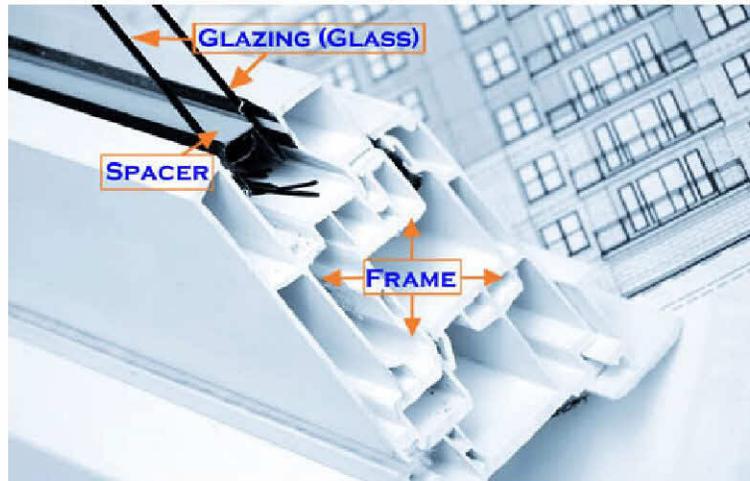
## ANATOMY OF A WINDOW

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### Anatomy of a Window

When shopping for new windows, doors, and skylights, there are several choices that will be made based on preferred style, material, and budget. As a shopper, particularly first time shoppers, the process of purchasing windows and making wise choices can be simpler if you understand the general structure of a window, know the options that you will face, and recognize how choices can affect the overall efficiency of the windows you purchase. Among the options you will face are the number of glazing and the frame type. Information may also be provided on the spacer that separates the panes of glass, as well as the gas(es) that fill the space between glazings.



This image represents a DOUBLE GLAZED vinyl window.

**Glazing:** The transparent or semitransparent in-fill material in a glazing system.

**Glass:** An inorganic, amorphous substance, usually transparent, composed of silica (sand), soda (sodium carbonate), and lime (calcium carbonate) with small quantities of other materials.

Windows are often described by the number of glazings they contain:

Single-Glazed	=	One pane of glass
Double-Glazed	=	Two panes of glass
Triple-Glazed	=	Three panes of glass*
Quad-Glazed	=	Four panes of glass*

\*In some instances, at least one layer of glass may be replaced by a lighter transparent material to lessen the weight of the total window

The space between the layers of glass is filled with a gas or combination of gasses, which is then sealed in place, creating a sealed insulated glazing unit. Though there are a number of gasses used (such as Argon, Krypton, Xenon, and others), and each window manufacturer may have its own proprietary formula, all are chosen for the increased ability of the gas (compared to normal air) to insulate the window. (The gasses used are odorless and harmless should the window break.)

In addition to the gas fill, window glass may be treated to further increase the energy efficiency of the window. There have been significant technological developments involving low-emissivity (low-E) coatings on the glass. There are many glass products available with low-E coatings, which are typically used with multiple-pane insulating glass units.

Emissivity is the ability of a product's surface to reflect heat back into a room during a cold winter day or to keep the heat outside on a hot summer day. A product with high emissivity, such as a clear piece of glass, will allow over 84% of the infrared energy from a warm room outside to the cold air. The lower the emissivity of the glass, the lower the rate of heat loss and the lower the U-factor.

**Spacer:** The component that separates and maintains the space between the glazing surfaces of an insulating glass unit (IGU), excluding any sealants.

As with the glazings and frame, there is no "one" spacer type and manufacturers are always experimenting with new ways to reduce the window spacer's impact on the overall energy performance. Current spacers may be made of metal, non-metal materials, or a combination of both. Because they are located within the window structure, spacers can affect the overall window performance rating based on the conductance of the material(s) from which they are made.

Conductance is the measure of how a material takes on and transfers temperature. For example, in cold weather, materials with a high conductance will become colder and, when attached to the home, will cool the air as it circulates by it. With poorly insulated windows, the rapidly cooling air around a window in winter can create a draft (technically known as convection) as the heated air circulates by the window, cools, and falls. (This is not to be confused with "air leakage," which is a draft that is created by air coming in from outside either through a poorly insulated window or spaces between the home's wall and the window frame – see

[Energy Ratings](#) for more information on Air Leakage.)

**Frame:** The enclosing structure of a window, door, or skylight which fits into the wall or roof opening and receives either glazing, sash, or vents.

**Types:** Wood, metal (aluminum), vinyl, fiberglass, and composite (combination of materials)

*The choice of frame material for your window can depend on many factors – style preference, cost, building needs (weight of material, for example), and upkeep. Material choice can also affect the window's overall rating performance, as some material may have benefits in one area at the expense of lower performance in another with regard to conductance and convection (see discussion for "spacer"). With improving technologies, manufacturers have developed products that incorporate several materials to gain the advantages of each; manufacturers have also developed treatments for the various materials that improve their overall performance.*

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