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Glazing

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Windows and other glazed external surfaces have a major impact on the energy efficiency of the building envelope. If not designed correctly, they can allow substantial unwanted heat transfer between the interior and the exterior of the home. If designed correctly, they can help maintain year-round comfort levels in your home.

A window has two vital component - the frame and the glazing. Both parts of the window are important in achieving the right level of energy efficiency.

Heat loss and gain in a well insulated home occurs mostly through the windows. In summer, each square metre of glass in direct sun can allow as much heat in as would be produced by a single bar radiator.

In winter, losses from a window can be ten or more times the losses through the same area of insulated wall.

Choosing energy-efficient windows, positioning them well and passively shading them is a cost-effective investment that will keep your home comfortable, quiet and economical year round.

A well designed passive home with energy efficient windows can reduce the heating or cooling except in the most extreme climates. With good passive design, windows can trap warmth in winter and repel summer heat. They admit cooling breezes and exclude cold winter winds.

When replacing windows in an existing home, choose the best windows for your climate and orientation.

Selection of appropriate window frames and glazing is important for good passive design. Careful consideration of passive heating and cooling, orientation, shading, insulation and thermal mass are also vital.

There are literally thousands of glass types to choose from. Choosing the right glass is a major factor in determining the energy efficiency of a window and will determine many other desirable properties such as light transmittance, noise control and security.

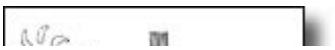
GLAZING TERMS

Glass products are generally classified as being either absorbent or reflective.

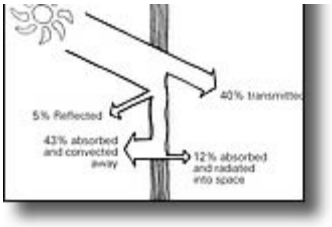
Solar radiation that is not reflected or absorbed is transmitted through the window.

Tinted or "toned" glass is the most common type of absorbent glass. Toned glass acts like sunglasses to reduce the solar radiation entering your home, which helps to keep it cool in summer.

Toned glass includes the basic tones (usually available in bronze, grey



and green) and a range of "super tones" which provide even greater reductions in solar heat gain.



Reflective glass has either a vacuum-deposited metal coating or a pyrolytic coating. Vacuum-deposited coatings are soft and must be glazed facing indoors. Pyrolytic coatings are hard and durable and can be glazed facing outdoors. Where glare may annoy neighbours, reflectivity should be kept below 15 to 20 percent.

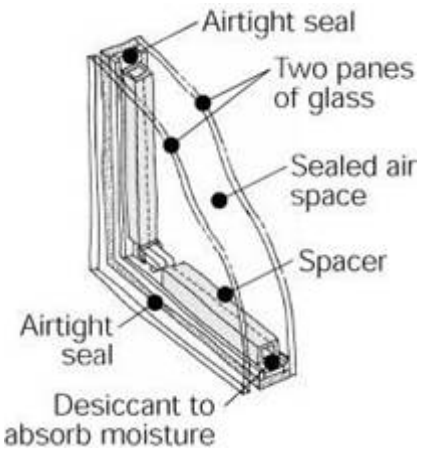
Spectrally selective glazing is commonly used for cooling climates or for westerly elevations where solar control and natural lighting are a priority. Spectrally selective glazing maximises light transmission while simultaneously reflecting unwanted solar radiation (UV and near infrared). Spectrally selective coatings can also have low emissivity.

Low emissivity (low-e) glass has a coating that allows short wavelength energy (daylight) from the sun to pass into the house but reduces the amount of the long wavelength energy (infrared heat) that can escape through the window. That is why this type of glass is often called a Ôheat mirror'.

Polymers are used instead of glass in some applications, such as translucent glazing and skylights. Plastic glazings may also be included in composite laminates to improve impact resistance or within double glazing to improve insulation.

Single glazing offers little resistance to the passage of heat. The small amount of insulation that single glazing does provide is actually due to thin films of still air that exist next to the glass.

Double-glazing offers much better insulation. It comprises two panes of glass with a sealed space between. The space is filled with air or an inert gas with better insulating properties than glass.



The best thermal performance for air-filled units occurs when the space between the panes is about 12 mm. If the double glazing is also to be used for noise reduction, a wider gap may be appropriate with some trade-off in thermal performance.

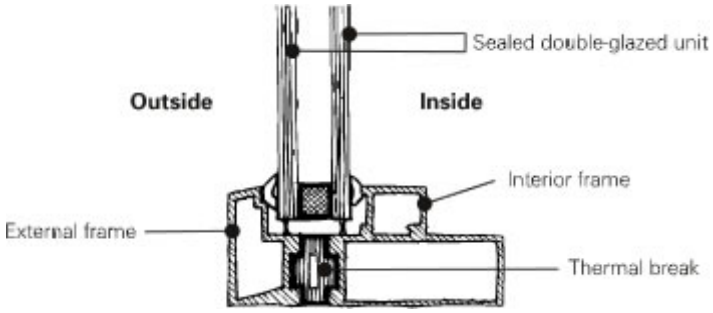
For best performance , solar control glass should be used for the outer pane and low emissivity glass for the inner pane. The solar control glass prevents unwanted solar radiation entering, while the low emissivity glass reduces heat loss from inside. The low e glass also blocks heat radiated from the outer pane of glass when it heats up.

A low cost alternative to conventional double-glazing is to use a thin, flexible, transparent polyethylene membrane in place of the inner pane of glass. The membrane is attached to the window frame using a high quality, transparent tape and shrunk taut using a hairdryer.

This system can provide performance similar to that of plain, clear double-glazing at a much lower cost. It can be applied to almost any glazed fixture that has a frame.

WINDOW FRAMES

After the glazing, frames have the greatest impact on window energy performance.



Aluminium w indow frames are light, strong, durable and easily extruded into complex shapes, but aluminium is a good conductor of heat and can decrease the insulating value of a window by 20 to 30 percent. Aluminium frames (especially dark coloured ones) in full sun can become hot to touch and cause discomfort to people close by. A large amount of energy is also used (and greenhouse gas emitted) in making aluminium. Aluminium windows can be recycled at the end of their lifespan to reduce this impact.

Some manufacturers may be able to provide aluminium frames made from recycled material, which greatly reduces the energy used during manufacture.

A thermal break is often used to reduce the heat conduction of aluminium frames. A thermal break splits the frame components into exterior and interior pieces using a less conductive material to join them.

Timber is a good insulator but requires more maintenance than aluminium. Timber frames swell and shrink in response to changes in temperature and humidity. They therefore require larger tolerances, which can result in gaps unless special draught sealing is provided.

uPVC (plastic) frames are relatively new in Australia. Their insulating properties are similar to timber but they require less maintenance.

Fibre-reinforced polyester (FRP) frames are used overseas and are the most thermally efficient framing materials available.

Composite frames are also available. These frames commonly use thin aluminium on the outer sections with either a timber or uPVC inner section.

Composite frames are often called Ôthermally improved frames'.

THE WINDOW ENERGY RATING SCHEME (WERS)

WERS can assist you in choosing the most energy-efficient windows. **WERS** rates the energy performance of residential windows.

There are 27 generic types of windows which have been given an energy star rating according to their heating and cooling performance.

Star ratings take into account the effect of both the window and the frame. WERS will help you to determine whether heating, cooling or both are more important in your climate.

WERS rated windows carry a sticker, a certificate and marketing material that show the star ratings for heating and cooling performance plus other useful information. Look for the WERS label when selecting a window and choose the window with the highest star rating appropriate for your application and budget. Talk to the manufacturer or retailer to identify key requirements for

your home.

To find out the WERS ratings of a window, you can go to www.wers.net

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