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creating  
solace  
in your home

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WITH DOUBLE GLAZING

KAREN PORTER



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ISBN: 978-1-4835881-6-2

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# CREATING SOLACE IN YOUR HOME

## *WITH DOUBLE GLAZING*

### **Introduction**

I have been in the construction industry for over 10 years now and I am passionate about energy efficient homes. My mission is to educate Canberra home owners so that they can have a more comfortable home with double glazing and better insulation.

Canberra is a place where you heat your home for about 7 months of the year. Therefore, it is vital to try to get the benefit of free heating from the sun and to also trap the heat in your home. I enjoy a warm home in winter and I like to keep cool in summer. I believe that your home is your sanctuary, a place where you can relax and enjoy some down time. It is a place where you want to be in your desired temperature and feel comfortable.

A perfect way to have the right temperature is to make sure that your home is well insulated. Our Government is very particular on what wall and ceiling insulation should be used. What they have forgotten is that where we have window and door openings then they should be insulated too. Most people miss this important point.

I live in Canberra which is one of the coldest places in Australia and we are still using single glazed aluminium windows and doors as standard inclusions in our new homes. Crazy, right? These windows and doors don't have any insulation value at all. We are in one of the coldest climates in Australia and we don't insulate our windows and doors! However, we do insulate the walls right next to the openings.... Why? Because we must! The answer is that we can shut our heavy drapes and put pelmets on every window to keep our heat in during winter and keep

it out in summer. I know that I like to have the light coming in from outside and I like to look outside as well. Once you open these curtains or blinds, then the insulation is gone and the heat will escape. Imagine not having to shut your curtains and blinds and still be able to keep your house warm in winter and cool in summer.

It is time, fellow Canberrans, that we looked outside the square of how we have always built homes and be a little bit more innovative with our insulation. The outcome will be a comfy home that is cheap to run, nice to be in and healthy to live in.

I hope that you find this e-book informative, there is more information on the Australian Window Association Website [www.awa.org.au](http://www.awa.org.au) and I have sourced many facts from there for this e-book.

I hope that you put your comfort first and make your home a pleasure to live in. It will also help you with resale and lower energy bills.

*Karen*

## Australian Climate Zones

Choosing energy efficient windows will make your home more comfortable, dramatically reduce your energy costs and help to create a brighter, cleaner and healthier environment. Windows and doors can severely impact on heating and cooling loads of a home. **Between 46% and 61% of home heating can be lost and between 79% and 86% of heat can be gained through windows and doors.** By using the right windows and doors for your climate, you can reduce energy costs and Australia's greenhouse gas emissions.

There are eight climate zones in Australia and Canberra is in Zone 7:

**Cold Climate Zones:** 6, 7, 8 (most of Victoria, Australian Capital Territory, Tasmania, and some Southern parts of New South Wales and Western Australia)

<b>Considerations</b>	Try to get as much sun into your home for most of the year and reduce heat flowing into and out of your home throughout the year,
<b>Preferred uValue</b>	Low as possible
<b>Preferred Solar Heat Gain Co-efficient</b>	High - so that you can let the sun in
<b>Other Factors</b>	Make sure you have the right shading on your home (e.g. eaves over North-facing windows)
	Approximately 10,000 to 15, 000MJ of energy

**Cost and  
Greenhouse  
Gases Savings**

saved per star, mostly heating - worth about \$300/year and approximately 1.0t of GHG. (Based on Melbourne/Hobart, 240m house)

## Window Energy Rating System (WERS)



### How do you know if your windows are insulated?

Australia has a Window Energy Rating Scheme (WERS) which means that windows are rated and labelled for their annual energy impact on a whole house, in any climate of Australia. To participate in WERS, window manufacturers must obtain energy ratings for their products from a rating organisation that is accredited by the AFRC (Australian Fenestration Rating Council). The Window Energy Rating Scheme is managed by the Australian Window Association (AWA).

WERS is independent of any manufacturer and acts as a fair, rigorous and credible system for testing performance claims. WERS rated windows must meet all relevant Australian standards. The scheme forms part of the quality assurance that smart manufacturers offer their customers. It is all about certified performance. It is very important that you only use window and doors that have been tested to the Australian Standard and that their certification is legitimate. You will be assured that your windows and doors are fit to endure the harsh Australian climate.

Windows are tested in accordance with the requirements of Australian Standard 2047. The tests completed are:

1. **Structural:** Measures deflection of the window (SLS) @ Span/250.

2. **Operating Force:** Confirms opening force is within the set limits.
3. **Air Infiltration:** Measures air leakage through the window or door.
4. **Water Penetration:** Measures water penetration resistance (WPR).
5. **Ultimate Strength:** Confirms the window meets ULS requirements.

Windows are tested for combinations of wind loads (SLS and ULS) and WPR for all classes of building types. The performance results dictate where the windows and doors can be used based on the requirements for the type of construction and site.

Source: [www.awa.org.au](http://www.awa.org.au)

### **WERS rated windows are a good investment**

Most importantly WERS rated windows are now, more than ever, a good investment as they can be recognised and effectively marketed as a Liveability Feature™ during the sale or lease of a home. They must be brought to the attention of a trained Liveability Real Estate Specialist and marketed correctly.

So, when purchasing windows for your new home or your home renovation ensure that you contact a WERS member to get WERS rated windows and ask them for a WERS certificate. The trained Liveability Real Estate Specialist will need this WERS certificate as proof of the performance of the windows for them to be recognised during the sale or lease of a home.

## Ratings of Windows and What do they Mean?



### What is a uValue?

Wall insulation is measured as an R Value – the higher the RValue, the better the insulation. Windows use U Values which is the opposite of an R Value and with Windows and doors we want the rating as low as possible.

The uValue ( $U_w$ ) measures how a window conducts heat. It is a measure of the rate of heating loss or gain through the unit. The rate of heat is indicated in the terms of UValue of a window assembly and includes the effect of the glass, frames, seals and the spacer bar. The lower the uValue the greater a windows resistance to losing heat and the better insulation you will have.

## Indicative window types

### Total window system values

*NOTE: These values are indicative only and cannot be used for compliance purposes.*

Source: Window Energy Rating Scheme; Copyright owner: The Australian Window Association

	<b>U<sub>w</sub></b>	<b>SHGC</b>	<b>TV<sub>w</sub></b>
Aluminium window — single glazed with 3mm clear glass	6.9	0.77	0.80
Timber or uPVC window — single glazed with 3mm clear glass	5.5	0.69	0.72
Aluminium window — double glazed with 3mm clear glass/6mm air gap/3mm clear glass	4.2	0.69	0.72
Timber or uPVC window — double glazed with 4mm clear glass/16mm air gap/4mm clear glass	2.4	0.61	0.65

### What is Solar Heat Gain Coefficient (SHGC)?

The Solar Heat Gain Coefficient (SHGC) measures how much sun flows through a window, whether it is straight from the sun or absorbed through pavers or other material then released inwards to the home. SHGC is a decimal between 0 and 1.

The lower a window's SHGC, the less solar heat it transmits. In colder climates, we want as much sun as possible coming in during the cooler months.

## **What does Visible Light Transmittance mean?**

A measurement is taken on how much natural light comes through a window. It is an optical property that indicates the amount of visible light that is transmitted. It is expressed as a decimal between 0 and 1 – the higher the number then the more light comes through the window.

## **How is air infiltration determined?**

Air infiltration or air leakage shows how much air leaks through cracks in the window assembly. The lower the figure, the less air moves through the cracks in the window assembly which means a better energy rating for the window or glazed door.

## What is Double Glazing?

Double glazed units are also known as Insulated Glass Units (IGU). They mainly insulate your home against heat loss and with a change to the glass makeup can also reduce heat coming into your home. There is also the benefit of a quieter home. Double glazing also keeps your cooling in during summer and is like an esky. It will keep your home warm in winter and cool in summer.

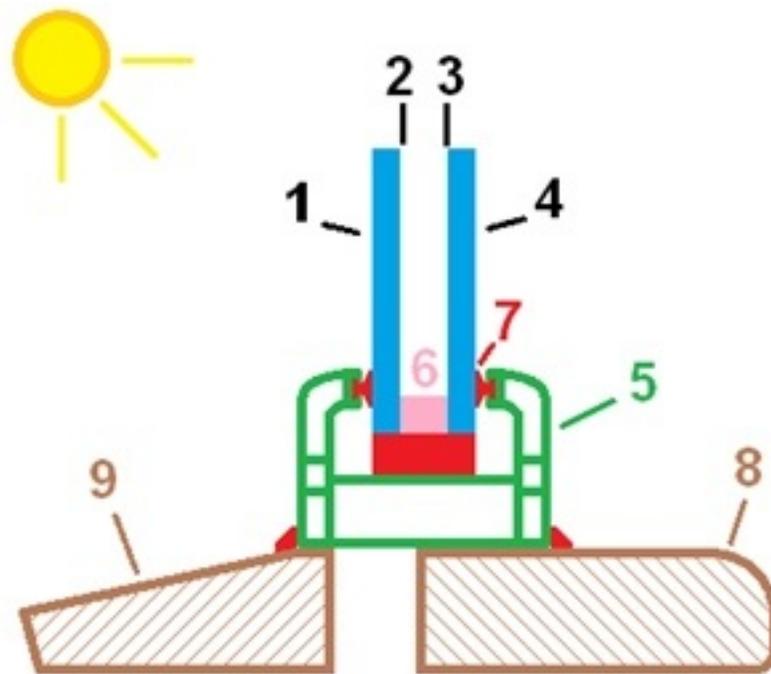
A double-glazed unit is comprised of two panes of glass as per below and the component of an IGU is the air gap between the two glass panes. The optimum air gap is between 12 and 20 mm. The gap is filled with either air or an inert gas which is a much poorer conductor of heat than the glass. This means that less heat will escape through an IGU than a single glazed window. Think of IGUs in the same way that you think of wall insulating batts.

The air trapped between the two panes of glass forms an insulating layer between your home and the cold outdoors. The sealed air space makes it much more difficult for heat to be transferred through conduction.

Standard double glazing will not stop the sun coming in during winter. This is one of the most commonly asked questions from our clients. It is still glass. You need the sun to come into your home during the cooler months so that you can benefit from the free heating. Double glazing lets in the sun and then traps it in the home. Your heating also stays in your home.

Insulated Glass Units can also be triple glazed; however, this is not as popular in Australia as it is in Europe. We don't have extreme temperatures in Australia like there is in other parts of the world. There are new glasses on the market such as Lightbridge that provides the same energy rating as triple glazed units without the bulk of triple glazed units.

The drawing below is a simple explanation of a double-glazed unit (source Wikipedia):



*1, 2, 3, 4: Glass pieces in the unit*

There are two pieces of glass in the unit with four surfaces in total and the sides of the glass units are named to avoid confusion when making the glass. The argon is injected in the gap between the glass.

*5: The Window Frame*

This is the window frame and can be aluminium, timber, uPVC, fibreglass or a composite.

*6: The Spacer Bar*

Double glazed units are put together in the glass factory; they are not assembled at the building site or at the home. The two pieces of glass are held together with an aluminium or insulated spacer bar that seals the space and keeps the glass in place. The bar goes between the two pieces

of glass and is of various widths. The optimal spacer bar (air gap) for effective insulation is between 10mm and 20mm. The bar has desiccants inside to prevent humidity and condensation between the two panes of glass.

The double-glazed unit can be made up of various glass types to keep the heat out, keep noise out or in and increase security.

### *7: Seals*

The seals are attached to the frame and press up against the glass unit to stop airflow. It is very important that the windows and doors seal well so that you don't have any gaps.

### *8: Timber Reveals*

The timber reveal surrounds the window and is a fixing point for the installation of your window or door. This is also known as your window sill.

### *9: External Sill*

This is the external window sill or brick sill.

## How much does double glazing cost?

### Life cycle costing

Glazing is a significant investment in the quality of your home. Walls of glazing create light-filled living areas.

The cost of windows and the cost of heating and cooling your home are closely related. An initial investment in energy efficient windows can greatly reduce your annual heating and cooling bill. Energy efficient windows also reduce the peak heating and cooling load, which can reduce the required size of an air conditioning system by 30%, leading to further cost savings.

The Australian Window Association has developed a tool (see [www.efficientglazing.net](http://www.efficientglazing.net)) that calculates the savings that may be achieved by energy efficient glazing. This tool compares window selections to a base aluminium window with 3mm clear glass.



**New Home**

Double glazing in a new home is easier to show energy savings from the first year and we can show you how the double glazing will pay for itself in energy savings.

Double glazing costs have reduced over the past 10 years by window companies offering cost effective, highly efficient, quality double glazed windows. There are varying levels of double glazing and each will give you a different performance. If you want to get the best outcome from the money that you spend then you need to choose an insulated frame and an insulated glass unit. This will be thermally broken aluminium, uPVC or timber. Solar film is not double glazing as there is no air gap and will never perform as well as double glazing.

Double glazing alone saves about 90% of heat loss that is usually achieved with heavy curtains and pelmets. Quality curtains for an average home can cost upwards of \$20,000. Double glazing allows savings using cheaper curtains that are still needed for privacy or to make your home look nice.

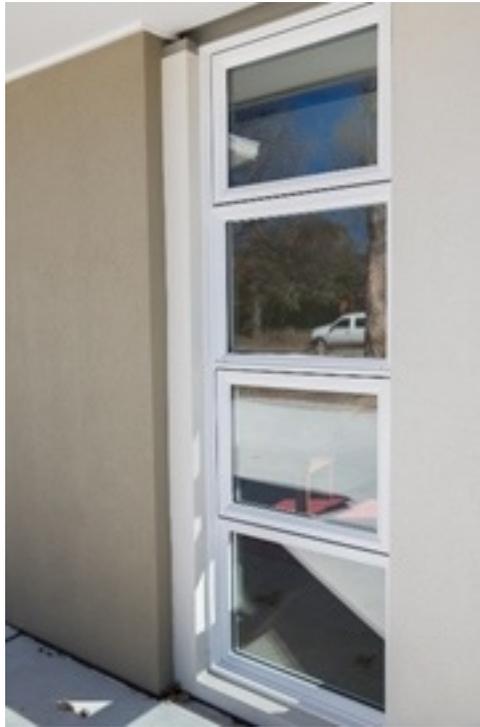
The cost to upgrade from single to double glazing in a new home may be double (for example \$10,000 investment). This \$10,000 added to your mortgage is approximately \$450 a year in mortgage repayments. The money that you will save on your energy bills is approximately \$1400. This means that you are \$950 ahead each year just because you double glazed your home. Double glazing a new home will pay for itself very quickly.

When building a new home, would you only insulate the walls in half of your home or decide the bathroom doesn't need wall insulation? No? – why would you do the same with the insulation of your windows and door spaces?

## **Existing Home**

In an existing home, the pay back on your double glazing could be 15

years. However, from the first day that your windows and doors are replaced, you will have a very comfortable home with no draughts and your home will feel more comfortable. You will not have to close your curtains to retain the heat and the sun coming through will be trapped in your home. You will save money on energy from the first day as your heater or air conditioner will not need to be on as high or as often.



## **What glass should I use and where?**

There are two questions that you need to ask yourself: which way do my windows face? What area do I live in?

Where you live and the direction your windows face play an important part in window and glass selection. Canberra is in a cold climate and on average home owners spend less than 30% on cooling their home but spend 70% heating it. Correctly designed windows can help eliminate the need for artificial heating and cooling.

### **North Elevation**

On the north elevation, we need to achieve passive solar heat gain through winter and shading in summer. This means that you need eaves to the required depth so that the summer sun is blocked and the winter sun can enter the home. A standard double glazed unit 4mm glass/16mm air gap/4mm glass will be sufficient for the north facing windows as they will allow the maximum sun in during the cooler months

### **South Elevation**

The south elevation will not get the sun so it is important that the uValue on the window or door is as low as possible. The use of low e glass on the south side may help the heating to stay, however, when you weigh up the cost of the low e glass compared to the benefits you get, then a standard double glaze unit will suffice.

### **East Elevation**

The east elevation will get the morning sun and this is lovely in the cooler months. Shading that is used in the hotter months and then retracted for the cooler months is the most appropriate.

### **West Elevation**

The west elevation will get a lot of hot sun in the afternoon in the middle of summer. However, in winter, many home owners appreciate the warmth in the afternoon. It is best to use retractable shading, so that you can manually manage the sun entering your home.

## **Window and Door Types**

### **Thermally Broken Aluminium – Double Glazed**

There are many levels of standards within the thermally broken aluminium ranges. The main advantage with thermally broken aluminium is that there is a system inside the aluminium that stops the transfer of heat and cold through the frame. The aluminium can achieve better insulation ratings than that of standard aluminium.

### **Standard Double Glazed Aluminium**

For those people on a budget, this would be the minimum that I would choose. The airgap must be no less than 10mm or you will not notice a benefit from having double glazing.

### **Double glazed uPVC**

uPVC windows that have been tested to the Australian Standard are designed for our harsh climate. They have an insulated frame and they don't conduct heat or cold. They take a generous double glazed unit and have multi point locks and seals. uPVC is resistant to corrosion caused by salt-laden air making them ideal for coastal properties.

Double glazed uPVC windows can be used in Australia in areas where risk is zoned as Bushfire Attack Level 29kW/m<sup>2</sup> (BAL 29). Some uPVC windows have been tested to withstand BAL 40.

### **Timber Double Glazed windows**

Timber frames are a good natural insulator. They do require larger tolerances in openings which can result in gaps that allow air infiltration unless good draught sealing (weather stripping) is installed. Timber absorbs carbon dioxide as it grows and retains that carbon until the wood is burnt or decays. Timber species must have naturally high durability or be treated to prevent decay and deformation. Check that the timber is

sourced from a sustainably managed forest.

## **Composite Windows**

Composite frames use thin aluminium profiles on the outer sections with either a timber or uPVC (plasticised polyvinyl chloride) inner section. These combine the low maintenance and durability of aluminium with improved thermal performance.

## Window Styles

There are many combinations of our window and doors and doors and you are not confined to standards. Everything that we do is custom designed and custom made which means we can be quite innovative. Please find below the more common styles of windows. Each type has its own purpose and function and should be designed with the room in mind. *(drawings courtesy of Eurotech Windows)*

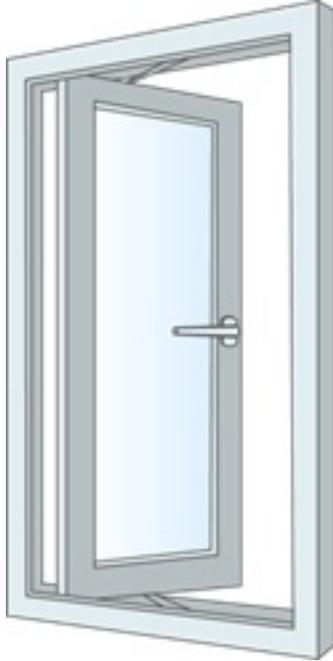
### Awning Windows



Awning windows have a hinge at the top and can wind out or be pushed out – depending on the supplier. They are good for cross flow ventilation and they seal very well. In terms of getting a big breeze in, they are not as good as some of the other styles.

Width of awnings are restricted to maximum 1200 and 1600 mm high.

### Casement Windows



Casement windows have a hinge on the side and are great for getting air into the home. They can be locked in the semi-open position and can seal very well.

They can be pushed out or wound out – depending on the supplier.

Width of casements are restricted to 750 mm wide and height is generally good at less than 1600 mm high.

### **Tilt and Turn Windows**



Tilt and turn windows are very popular in Europe and have the benefit of a multiple opening function and the seal very well. They can be locked in the open position and are perfect for evaporative cooling systems. They do open internally and you will need to be more creative with your window coverings.

They can be full height and are usually restricted to 1000mm wide as they open internally into the room.

### **Sliding Windows**



Sliding windows are convenient as they slide flat and don't intrude inside nor outside. They don't seal as well as the hinge windows, however, they seal a lot better than many sliding windows on the market.

Sliding height is capped at 1500 mm and width will vary depending on how the system is designed.

### **Tilt and Slide Windows**



Tilt and slide windows have the benefits of a hinge window and a sliding window. They tilt into the room and then slide. The benefits of tilt and slide windows are better seals and the flexibility of sliding or tilting.

You can lock the window in a tilt position and have security.

### **Double or Single Hung Windows**



Double or single hung windows have the same benefits as sliding windows except they push up or down. They don't seal as well as a hinge window but are beneficial for air flow. They also don't impact on your curtains or blinds. Not many uPVC companies make these windows.

## **Door Styles**

### **Sliding doors**



Sliding doors are convenient as they don't protrude into or out of a room. They are flat, your curtains still work and kids find them easier to operate. You can also get a sliding screen on sliding doors as part of the system.

The width is restricted at 2400 mm wide for a single slider, 3000mm wide for a triple slider and 4800 mm wide for 4 panel sliding door.

### **Tilt and Slide doors**



Tilt and slide doors are like a hinge door and a sliding door. They tilt into the room and then slide. The benefits of tilt and slide doors are better seals and the flexibility of sliding or tilting. You will need a retractable flyscreen door by another supplier.

You can lock the window in a tilt position and have security.

### **Stacking Door**



Stacking doors allow a wider opening to be achieved where the doors

stack back to one. Max size for this door is 3000 mm wide and a retractable flyscreen door will need to be sourced.

## **French Doors**



French doors seal well and you can open them inside or outside. You will need to source a retractable flyscreen door for these units. You can add bars horizontally or vertically to achieve a different look and you can also add frosted glass.

They have a low threshold and are suitable for wheelchairs.

Max width is 1950 mm and height 2400 mm

## **Lift and Slide doors**



Lift and slide doors have the benefit of sealing like a hinge door, they have a low threshold. They are suitable for wheelchairs.

They can fill big openings with minimal doors. The door pictured at right can go to 2400 mm high x 6000 mm wide. They glide easily and are great for entertainment areas.

## **Types of Glazing**

A wide variety of glass products is available. The thickness of glass has negligible impact on its U-value and SHGC. However, it does have a significant effect on noise transmission and the strength and safety of the glazing.

### **Air vs argon**

Most double glazed units are air filled; however, it is becoming more common place to inject an inert gas like argon into the sealed unit. Argon is injected into the double-glazed unit in the factory and sealed to prevent leakage. Argon gas is an even poorer conductor of heat and conducts about 33% less heat than air. There is some research to suggest that gas leaks over the years, however, it is at a very slow rate if any. The price of argon has reduced and it is now very affordable. Some companies provide the argon fill as a standard feature.

Glass products can be divided into several categories.

### **Toughened/Safety Glass**

It is important that you ensure that your home meets the Building Code of Australia and the Australian Standards for glass and glazing. If you don't have safety glass in the required positions, then you may not get building approval.

There are two types of safety glass recognised by the Australian Standard that are for windows and doors. Safety glass is glass that minimises the risk of injury when broken:

Toughened glass is 5 times stronger than annealed glass and is used in doors, glass next to doors, wet areas, where the glass is less than 500mm off floor level and where holes need to be cut for cat flaps. The glass is toughened by putting ordinary glass through a heating and cooling process. If it breaks it will reduce to small blunt edged particles.

Laminated glass is generally 2 pieces of ordinary 3mm glass sandwiched with a .38 laminate in between and this glass can reduce noise transfer. Laminated glass when broken will tend to remain intact and is ideal to prevent forced entry into your home. The interlayer holds the glass together. Laminated glass will also stop approximately 99% of UV coming through your windows and doors which means that you get less fading of your furnishings and less risk of sunburn.

### **Toned Glass**

Toned glass has colouring additives included during manufacture. It is available in various colours, usually bronze, grey, blue and green. The different colours provide different SHGC and some variation in TVw. Body tinting does not change the U-value of the glass because glass conductivity is unaffected by the presence of a pigment in the glass. Other toned glass options include ‘super toned’, which has heavier pigmentation that preferentially transmits visible wavelengths while filtering out solar near-infrared wavelengths. This provides lower SHGC while preserving adequate TVw.

### **Low Emissivity Glass**

Low emissivity glass (commonly known as low-e glass) has a soft or hard coating on the glass. The soft coating should only be used in a double-glazed unit. It is useful to know that the sun has 3 parts that affect windows:

1. Ultra Violet Light – causes fading and skin damage
2. Visible Light
3. Infra-red light or heat energy

Low-e coatings have been developed to minimize the amount of ultraviolet and infrared light that can pass through glass without compromising the amount of visible light that is transmitted. The ability of a material to radiate energy is known as emissivity and if you glass

has a low-e coating it then you will keep the heat in the home in winter and heat out in summer. The downside is that the film is on all year round and may block your beautiful summer sun.

Low e glass can have a hazy look when the sun is shining on it.

### **Laminated glass**

Laminated glass has a plastic glazing layer, called an interlayer, to improve impact resistance. This interlayer is placed between two sheets of glass to reduce the danger of the glass breaking and forming long dangerous shards. Typical applications include areas in the home most prone to injury from human impact such as bathrooms, doors, around staircases and in areas close to the floor. Laminated glass is also excellent for security – it is much harder to break through and can help with noise reduction.



### **Lightbridge Glass**

LightBridge™ double glazing units curb the flow of heat in and out of your home to an unparalleled degree. This allows you to have expansive glazing whilst still achieving an energy efficient home. LightBridge™ is also available in a range of levels of enhanced security, noise reduction and UV protection – putting the power back in your hands to make your home your sanctuary. The LightBridge™ range provides superior insulation by limiting the transfer of hot or cold air through windows – making your home cooler in summer and warmer in winter. There is no haze when you look through it in the sun.

## Design considerations

There are some considerations that you need to think about when building or renovating. You can find out more at: Source: <http://www.yourhome.gov.au/passive-design/glazing>

### Thermal mass

Thermal mass does not create heat — it just stores it. For thermal mass to provide beneficial evening heat in cool climates it is essential that glazing is used to admit solar radiation during the day to warm the mass (see Passive solar heating; Passive cooling; Thermal mass).

If thermal mass is used in warm and hot climates to absorb heat from the air, minimise solar gain through glazing and do not locate the mass where it is exposed to solar heat gain.

### Noise control



Sealing cracks and gaps around windows, and elsewhere in the building, is probably the most effective initial way to control noise, although appropriate windows and glass can assist with noise control.

Sealed double glazed units reduce medium to high frequency noises such as the human voice. To reduce low frequency noise such as traffic and aircraft, choose thicker glass, preferably in a double-glazed unit with a large air gap between the panes (20 mm or more) and a different thickness of glass on the other pane: such large gaps allow convection to occur between the panes and reduce insulating properties.

Thick laminated glass is also effective in reducing noise transmission but offers little in the way of thermal performance. Having a laminated glass on the outside pane such as 6.38 and a 4 or 5 mm on the inside pane will dramatically decrease noise transfer.

Sound is relative to the person hearing it and is measured over a range (termed frequency and is measured in hertz) – Hz. In a home, it is important that unwanted sound is managed and this can be done with your windows and appropriate wall insulation. The most popular terms when measuring sound reduction are:

dB – this is the measure of sound level compared to a reference level of 0dB – range is general 100---- 4000 Hz. Most people can only hear a difference of 3dB.

STC – Sound Transmission Class is a rating of how well sound travel through a building partition

OITC – outdoor indoor Transmission Class is a standard used to indicate the rate of transmission of sound between the outdoor and indoor spaces

Rw – a weighted reduction in sound intensity compared to a standard (ISO 717).

If a 10dB reduction is achieved that represents a 50% noise reduction. If a 20dB reduction is achieved, then 75% of noise is reduced. For higher frequency noise, interlayers are used to dampen the higher frequencies. If the wall mass is double then the acoustic insulation increases 6db and this is good for low frequency noise.

Double glazed units with at least a 12mm gap will reduce noise coming through your windows and an insulated frame such as uPVC or timber will further reduce the noise.

## **Acoustic solutions – keep the noise out with the glass units**

### **Traffic noise reduction**

4mm/12mm air gap/4mm will achieve a 19% reduction in noise transfer  
10mm/12mm air gap/6mm will achieve a 34% reduction in noise transfer

6.38 laminate/12 mm air gap /4mm will achieve a 46% reduction in noise transfer

### **Fading**

Exposure to sunlight causes many modern interior furnishings and flooring to fade. The wavelengths most responsible for fading are the ultraviolet, violet and blue wavelengths. Appropriate glazing blocks some of these wavelengths and reduces fading, but does not prevent it completely. A laminated glass will stop 99% of these rays coming into the home.

### **Condensation**

Condensation occurs when moist air is cooled or when it meets cooler objects. The interior and exterior surfaces of energy efficient glazing are closer to the adjacent air temperature, reducing condensation and the build-up of unsightly and unhealthy mould and fungus. Less efficient windows create greater differences between room temperature and glass surface temperature, facilitating the formation of condensation. Having a heater under your window with a moist towel drying on it will cause condensation also.

### **Shading**

Windows will always be made of glass and unless you put a tint or a low e glass on the units, the sun will stream through. It is important in Canberra to make sure that you allow as much winter sun in as you can

so that you don't use too much heating. Shading is always the best for east and west elevations – particularly shading that can be retracted for winter and put back in place for summer. Some considerations may be:

- Do not place deep covered balconies to the north as they obstruct winter sun.
- Balconies to the east or west can also obstruct winter sun to a lesser extent. Covered balconies should allow winter sun access.
- Avoid shading any portion of the north-facing glass in winter — use upward raked eaves to allow full winter solar access, or increase the distance between the window head and the underside of the eaves.
- Use deciduous planting to the east and west. Avoid plantings to the north that would obstruct solar access
- Using plants for shading Match plant characteristics (such as foliage density, canopy height and spread) to shading requirements. Choose local native species with low water requirements wherever possible. Plants can provide shade and act as windbreaks. In addition to providing shade, plants can assist cooling by transpiration. Plants also enhance the visual environment and create pleasant filtered light.
- Deciduous plants allow winter sun through their bare branches and exclude summer sun with their leaves.
- Trees with high canopies are useful for shading roofs and large portions of the building structure.
- Shrubs are appropriate for more localised shading of windows.
- Wall vines and ground cover insulate against summer heat and reduce reflected radiation.

Source: <http://www.innovationhouse.com.au/wp-content/uploads/2014/08/YOURHOME-%20Orientation.pdf>

## **Window Checklist for a new home or renovation**

When you build, buy or renovate, there are things you can do or features to look for to achieve the best thermal comfort your site or home can offer. The following points are a brief overview:

- Relocate living areas to take advantage of winter sun and cooling summer breezes.
- Maximise north-facing daytime living areas where passive solar access is available.
- Use smaller, well shaded windows to increase cross-ventilation to the south, east and west.
- Avoid west-facing bedrooms to maintain sleeping comfort.
- Locate utility areas (laundries, bathrooms and garages) on the south or west where possible.
- Avoid placing obstructions such as carports or sheds to the north.
- Plant shade trees in appropriate locations; landscape to funnel cool breezes and block or filter harsh winds.
- Prune vegetation that blocks winter sun; alternatively plant deciduous vegetation that allows winter sun in but provides summer shade.

Source: <http://www.innovationhouse.com.au/wp-content/uploads/2014/08/YOURHOME-%20Orientation.pdf>

## **Checklist for designing a new home, purchasing a new home or renovating**

### **Checklist for choosing a project home**

- Select a design that allows daytime living areas to face between 15° west of north and 30° east of north on your site. Most project home companies will mirror or flip a design to suit your needs at no extra cost. East is best in warmer climates and west in cooler climates.
- Turn north-facing verandas into pergolas (including those with adjustable blades) by replacing roofing material such as tiles or metal with slats or louvres, particularly over window areas.
- Shade east and west-facing glass by adding or relocating shade structures including verandas and deep covered balconies.
- Reduce the amount of south, east and especially west-facing glazing, or relocate some to north-facing walls.
- Select smaller windows on south, east and west-facing walls to aid cross-ventilation. Most project home companies will flip a design at no extra cost.

### **Checklist for choosing a unit**

Orientation is particularly important when buying a unit because external modifications such as shading are often prohibited by body corporate rules intended to preserve the visual amenity of the building.

- Solar access to living areas is highly desirable (except in the tropics).
  - Good exposure to cooling breezes is essential in hotter climates.
- Look for well-designed cross-ventilation to distribute cooling breezes through the unit.
- North-east corner units, north–south cross-over (split level) or cross-through (one side to the other) are ideal.

- North-facing living areas and balconies or outdoor spaces are ideal.
- Look for passive shading to north glass and well-designed adjustable shading to east and west.
- Avoid units facing west only.
- Look for sheltered balconies or courtyards with winter solar access.
- Sunny, sheltered spaces and facilities for community interaction are a desirable feature.

## Conclusion

The Canberra climate is fabulous in that we have four distinct seasons. However, we heat our homes for most of the year and need to make sure that keeping our homes warm is our priority. Shading, fans, natural ventilation will help you with the small amount of hot days or nights that we have.

The team at Solace Creations Double Glazing can help you to make the right choices for your home so that you can enjoy all the seasons in comfort.



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