

Quick facts

- With comfort we are typically seeking to cover two benefits:
 - ▶ Stopping the house getting too hot – gaining heat
 - ▶ Stopping the house from getting too cold – losing heat
- The increasing regulations on energy are also causing heat gain and heat loss to become part of the customer's buying decision. Energy regulations are state specific.
- An average home may lose up to 40% of its heat or air-conditioning energy through its windows.
- Energy efficient windows will reduce energy consumption.
- A common misconception is that double glazing or Insulated Glass Units (IGU's) best solve the energy regulation issue and the customer's demands for comfort. Neither is necessarily true.
- Every house is unique – location, orientation, what buildings or vegetation are around it, how the occupants live. Every person will have a different definition of what comfort means to them. We must understand the customer so we can recommend a comfort solution.
- It will not always be appropriate to upgrade all the glass in all the windows.
- Much can be achieved in cooling a house through selecting windows that promote ventilation and designing the house and position of windows such that air flow is promoted.
- The key measure of the insulating properties of the window is its U-Value – the lower the better.
- The key measure of a window's ability to prevent heat gain is the Solar Heat Gain Co-efficient (SHGC) – the lower the better.

Comfort and energy solutions

The best solution for an individual customer will depend on that customer's lifestyle preferences, house design and individual objectives – heating or cooling or perhaps both.

A major part of our tool set to address the comfort issue is glass. Some ideas:

- In cold climates the focus is to retain heat in the house – the lower the U-Value the better.
 - ▶ The best solution to insulate a house and prevent heat loss will probably involve an IGU. But there are many solutions that improve insulation without using

IGU's and equally there are many different types of IGU. The appropriate "value for money" solution will vary from customer to customer.

- In warm climates the focus is to prevent heat entering the house – the lower the SHGC the better.
 - ▶ The best solution to prevent heat gain in a house will probably involve the use of Low-E glass. Again there are many solutions that improve insulation without using Low-E. The appropriate "value for money" solution will vary from customer to customer.
- The selection of fenestration type is also important in resolving the comfort equation. Again the lifestyle requirements and objectives of the individual customer need to be understood to select the right fenestration. Key ideas:
 - ▶ Compression style windows (awning and casement) have the best seals and therefore have the least leakage through air infiltration.
 - ▶ Sliding, double hung and casement afford the best option for a customer who wishes to cool through natural ventilation and air flow.

Energy regulations

Every state in Australia has taken a different approach to the development and introduction of home building energy regulations. However from a window perspective they all draw on data from the same source – the Australian Window Association's (AWA) Window Energy Rating Scheme (WERS).

WERS rates residential windows (frame and glass combined) for their energy performance in typical housing anywhere in Australia. WERS rates windows in terms of their whole house energy improvement when compared to a base case window (an aluminium sliding window frame with 4mm clear glass). In other words, how good is this particular window used throughout the house at reducing energy consumption when compared to the same house glazed throughout with 4mm aluminium sliding windows.



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Using both computer modelling and physical testing, WERS provides values for the windows (frame and glass combined) U-Value and SHGC. These values are then entered into one of the variety of house energy rating tools used – FirstRate, AccuRate, NatHERS, BASIX, BERS – to provide energy ratings for the whole house according to the relevant state legislation and the Building Code of Australia.

BASIX

In NSW when building or extending a house, the project must meet the requirements of BASIX (the Building Sustainability Index). BASIX ensures homes are designed to use less potable water and be responsible for fewer greenhouse gas emissions by setting energy and water reduction targets for houses and units.

In designing the building the designer has flexibility to incorporate different elements for example rain water tanks, extended eaves, improved insulation. Depending on the options selected a score is awarded. What is critical is that overall the final design meets the energy and water targets. How they are met is the decision of the designer working in co-operation with the home owner.

From a window perspective, selecting more energy efficient windows will help significantly in achieving the energy target. Selecting a better window may negate the need to include other design items in the customer’s project, perhaps which they have only included to meet a BASIX target.

Remember, with windows it is not just about providing a window that provides “just enough” to achieve a BASIX score but rather providing the most appropriate window that provides value and benefit to the home owner and meets the BASIX requirements for the designer.

Glass – comfort and energy

Reducing heat gain

Heat gain is measured by the Solar Heat Gain Coefficient (SHGC) for a window. The SHGC is the fraction of solar radiation admitted through the window, both directly transmitted, absorbed and subsequently released inwards, expressed as a number between 0 and 1. If keeping a house cool is paramount, choose a glass that has a low SHGC.

The principal solutions we offer are:

- Low-E glass
- Tone glass

Low-E or low emissivity glass is a special glass that has a metallic oxide coating applied to it during the manufacturing process. The coating reflects and prevents the long wave heat energy from passing through the window but allows the short wave visible and UV energy to pass through. As such the glass dramatically reduces heat transfer through the window due to solar energy.

Note that Super Green glass is not Low-E glass. It is a high performance solar control glass ideally suited to conditions where energy costs for cooling are a consideration. Super Green glass transmits more visible light than standard tone glass but blocks more heat and UV rays.

Tone glass will also reduce solar heat gain but to a lesser extent.

It is a myth that IGU’s reduce heat gain. Incorporating an IGU with clear float glass has negligible impact on reducing heat gain. The unit will reduce heat gain if Low-E or tone glass is incorporated in the IGU, but the IGU itself adds little to the reduction of heat gain.

Glass type	SHGC
4mm clear	0.84
4mm tone – grey	0.68
4mm Low-E	0.61
6.38mm laminate clear	0.79
6.38mm laminate Low-E	0.51
6.38mm laminate Low-E – grey	0.50
IGU 4mm clear/6mm air/4mm clear	0.74
IGU 4mm Low-E/6mm air/4mm clear	0.69

It is important to consider the size of the heat gain issue before recommending a solution. A small window on the eastern elevation, shaded by trees does not warrant solar control glass. A large western facing window almost certainly does.

Reducing heat loss

Heat loss is measured by the U-Value of the window. The U-Value is a measurement of the rate of heat flow through a window. The lower the U-Value the better the window’s insulating performance.

The principal solutions we offer are:

- IGU
- Low-E glass

Insulating Glass Unit is a broad term and the configuration of the IGU has a dramatic impact on the performance of the window. The configuration covers:

- Glass type – each pane of glass in the unit can be a different thickness and type. Depending on the glass incorporated other benefits beyond insulation may be achieved for example fading reduction, security etc.
- Number of panes of glass in the unit – Stegbar can offer up 2 panes.
- Air gap – IGU’s can be produced to different widths.



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- Gas – the air gap between the glass panes can be filled with gas to further increase the insulating properties. At Stegbar we offer Argon.

In designing an IGU, the maximum thickness of IGU our window suites can incorporate must be allowed for.

	Aluminium		Cedar		A.T. 2000	
	Residential	Architectural	Residential	Architectural		
Window style	Without glazing adaptor	With glazing adaptor				
Awning	16.38mm		25mm	18mm	24mm	14mm
Casement	16.38mm		25mm	18mm	24mm	14mm
Double Hung	7.52mm	16.38mm	25mm	18mm		16mm
Sliding	7.52mm		8.38mm	18mm		16mm

Again, the size of the specific customer’s insulation issue must be considered before recommending IGU’s to a customer. In a warm climate with a mild winter, the benefit a customer may gain is likely to be small. That said, incorporating IGU’s in those rooms with high usage – living rooms and master bedrooms may afford a solution which gives a real comfort benefit to the customer and value for money.

The best of both worlds

For a customer seeking to reduce heat gain in the summer and reduce heat loss in the winter the optimal solution from Stegbar is an IGU incorporating Low-E glass. But this recommendation needs to be considered with caution. The individual circumstances, location of the window and objectives of the customer must all be carefully considered before tabling a recommendation.

Window styles

A compression sealing window (awning or casement) will have a better performance than an equivalent sized and glazed sliding window. This is because the awning and casement windows can be sealed much more effectively than a sliding window.

However the way a window operates can have a significant impact on the actual energy efficiency and liveability of the home. Awning and casement windows for instance rate equally well under WERS because they can be well sealed, but once the window is opened, an awning window will not ventilate as well as a casement window. If the home is likely to have the windows opened to maximise the use of natural ventilation then a casement may be a better alternative. Or if the home is in an area where air quality is poor, noise abundant, the wide opening of a casement window is not practical and/or the owners regularly use air conditioning, then an awning may be more appropriate.



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Stegbar comfort solution range

A comprehensive list of all Stegbar WERS rated window configurations is available on the R&D intranet **and the independent WERS website**. Below is a selection of windows to demonstrate the range of values available.

Window style	Glass type	U-Value	SHGC
Aluminium awning	3mm clear	6.570	0.649
Aluminium awning	4mm tone – high performance	6.530	0.441
Aluminium awning	6.38mm Low-E	4.970	0.400
Aluminium awning	3mm clear/8mm air/3mm clear	3.793	0.540
Cedar awning	3mm clear	4.903	0.603
Cedar awning	4mm tone – high performance	4.877	0.405
Cedar awning	6.38mm Low-E	3.411	0.366
Cedar awning	3mm clear/8mm air/3mm clear	2.264	0.495
A.T. 2000 Series	3mm clear	5.393	0.566
A.T. 2000 Series	4mm tone – high performance	5.356	0.383
A.T. 2000 Series	6.38mm Low-E	4.006	0.347
A.T. 2000 Series	3mm clear/8mm air/3mm clear	3.557	0.512

Pricing

Windows featuring a Stegbar comfort solution will cost more than a basic window glazed with 4mm clear glass. The percentage below should only be used as a rough guide to the likely premium. This is based on a 1m × 1m single lite window, and will vary depending on size and mandatory glass requirements designated by Australian Standards.

- 4mm tone glass – 5%
- 4mm tone high performance glass – 14%
- 6.38mm laminate Low-E – 46%
- IGU 4mm clear/8mm air/4mm clear – 23%



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