Modernise the Home

Key Reasons to Upgrade Your Window and Glazing Systems

GLASSWORKS

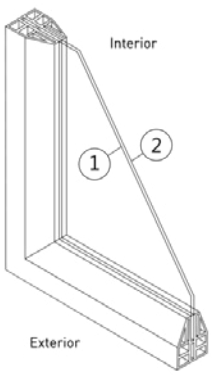
INTRODUCTION

Prior to the development of multi-layered glazing systems, exterior windows of buildings were typically single glazed, with only one layer of glass. Given the clear benefits of double or triple glazing, it may surprise many of us that people still use single-glazed windows. With the rising cost of energy and desire to reduce our carbon footprint, it is difficult to think that many Australian homes are not benefiting from installing better performing window systems.

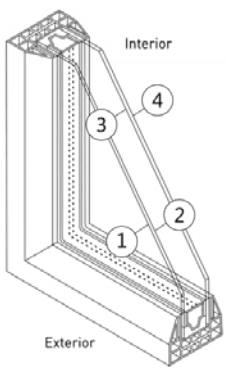
The widespread use of single-glazing window units goes against design trends and regulatory developments across the world. In the United Kingdom, for example, replacement glazing and new build properties must have double glazing as standard. In Europe and the United States, many of the single-glazed windows that have been installed in Australia would either be prohibited or strongly discouraged.

Against this backdrop, architects and builders need to shift away from single glazing to higher performing solutions. Below we discuss the key reasons for upgrading existing window and glazing systems, from meeting increasingly stringent energy efficiency and safety standards to opportunities to enhance a home's aesthetics using modern window and glazing systems.

Single glazed



Double glazed



"Double glazing is not always enough. Low-E (low-emissivity) coated double-glazed units offer added solar protection and insulation with a variety of options boasting different performance for different conditions."

PERFORMANCE FACTORS FOR GLAZING

While single glazing can be found in older structures in the US, almost all modern, energy-efficient structures have double or triple glazing units.[1] Are we heading that way in Australia? Considering the recent strengthening of energy efficiency requirements for new builds, it is almost a certainty.

Recently, federal and state building ministers were urged to immediately introduce more stringent energy efficiency standards for new homes in response to increasing energy costs. As a result, tougher energy efficiency rules were included in the 2022 edition of the National Construction Code (NCC) that require new homes and renovations to meet a 7-star NatHERS (Nationwide House Energy Rating Scheme) energy efficiency rating. Previously, the 6-star rating was the minimum standard in most states and territories.

For further guidance on the changes to energy efficiency requirements in the NCC 2022 and their impact on glazing performance, refer to “Raising the Bar: Glazing Performance for Residential Buildings Under the National Construction Code Energy Reforms” available on Glassworks’ website here.

The introduction of the minimum 7-star NatHERS rating means that the specification of high-performance windows is more significant than ever. According to the Australian Glass and Window Association (AGWA), up to 87% of a home’s heating energy can be gained, and 40% of it can be lost, through windows.[2] Double-glazed windows are significantly more energy efficient than single-glazed aluminum windows, as they can cut heat loss or gain by almost 30%.[3] Accordingly, double glazing can contribute significantly to a 7-star rating.

However, double glazing is not always enough. Low-E (low-emissivity) coated double-glazed units offer added solar protection and insulation with a variety of options boasting different performance for different conditions. Low-E windows allow natural light to enter the building, while reflecting heat and blocking infrared light from penetrating the glass from the outside.

The Window Energy Rating Scheme (WERS), developed by AGWA, has simplified window selection for architects, designers, and specifiers. Under WERS, windows receive a rating for both heating and cooling performance. The Solar Heat Gain Coefficient (SHGC), U-Value for insulation, and percentage of Visible Light Transmittance are the main factors considered when evaluating a glass’s performance or capacity to save energy.

WERS enables architects and specifiers to compare the ratings of frames and glass combined in a functioning window or door. Window units with double glazing (insulated glazing units or IGUs) combined with modern aluminum frames, thermally broken frames, or some uPVC frames can reduce internal to external thermal transfer by 50 to 75% or even more, compared to traditional aluminum frames with single glazing.[4]

For example, a 53mm sliding window with a 6mm single glazed uncoated pane of glass in a standard aluminium frame has a U-Value of 6.3 and an SHGC of 0.70, meaning the room is vulnerable to escaping heat in winter and heat gain in summer. While a similar window, only double glazed with a high performing clear low-E glass, achieves a much lower U-Value of 3.5 and an SHGC of 0.24.*

*Comparison denotes Bradnam’s ESS sliding window with a clear float versus a triple silver clear low-E with clear float in a 6/12/4 IGU make-up as reported in WERS.

WHAT TO LOOK FOR IN WINDOW PERFORMANCE

Low U-Value

U-Value measures how much heat is transferred through glass. The lower the value the better the insulation.

High VLT

Visible Light transmission measures the percentage of natural light entering a room and visibility from the inside out.

Low SHGC

Solar Heat Gain Coefficient measures how much solar radiation passes through the glass. The lower the value greater the thermal stopping power.

SAFETY AND SECURITY

In the past, the safety risk posed by glass windows was underestimated. Now, with the popularity of glass as an architectural element across commercial and residential sectors, it is important for architects and specifiers to protect users against accidental impact and glass breakage. Safeguarding against break-ins should also be considered as many robberies typically involve breaking a window.

Building codes and regulation include precautions to safeguard people from the risks posed by glass windows. AS/NZS 2208:1996 “AS 2208-1996 - Safety glazing materials in buildings” sets out the functional properties of various safety glazing materials, including toughened glass, laminated glass, wired glass, organic-coated glass and plastic, how various types of safety glass are to be tested and the categories for which they can be approved. The testing requirements for various glazing materials are intended to improve safety and lessen the possibility of piercing and cutting injuries from human impact. AS 1288:2006 “Glass in buildings—Selection and installation” regulates how glass can be safely installed depending on the type of building, where it is being installed, how high it is being installed and what kind of exposure the glass has to the elements.

When it comes to safety and security, single glazing typically underperforms. A single pane of glass is much easier to break and bypass, whereas multi-layered glazing solutions provide a much more robust option for the home or workplace. Double-glazed windows are more difficult to force open from the outside and are harder to break than single-glazed windows. Because it is more difficult to gain access through double-glazed windows and doors, burglars may be deterred from attempting a break-in in the first place.

If your home has single-glazed windows, it can be dangerous for kids or pets to come in close contact with them. The extra glass panes in multi-layered window units can handle a higher amount of impact. They can also be upgraded with safety glass, which are tested to the requirements of AS/NZS 2208 and designed to break into smaller pieces rather than shatter into glass shards. These measures provide a higher margin of safety.

“A window upgrade can make a significant statement if you want to improve the appearance of your home without completely redesigning the exterior of the building.”

MODERN AESTHETICS

A residential building’s visual appeal is largely dependent on its windows. A window upgrade can make a significant statement if you want to improve the appearance of your home without completely redesigning the exterior of the building.

Modern homeowners have very specific requirements for their windows and doors in terms of both uses and expectations. Modern, sleek designs are currently on trend, with many solutions designed to blend into the building’s facade to achieve a seamless appearance. Designers are making use of windows and doors with clean lines with few visual distractions, and some are experimenting with colour schemes and finishes.

Drab, old frames with a single pane of glass can accentuate the tiredness of an older house and diminish any attempts to update the exterior with a render or paint job. Updated window frames can add new life to a building, whether it is the contemporary look of modern aluminium frames or the organic warmth of solid timber frames, and you can complete the aesthetic with multi-layered glazing.

With today’s focus on health and wellbeing, floor-to-ceiling windows have become more common in new construction as our desire to connect with nature grows. It is now possible to add floor-to-ceiling windows without sacrificing comfort or efficiency thanks to recent advancements in glass and aluminum technology. However, as the NCC is demanding more out of building facades in terms of thermal performance, the more glass that is incorporated on a building’s exterior, the more important the performance of the glazing.

Beyond thermal performance, glass can be specified to fulfil other purposes. For example, you can specify patterned or opaque glass to add privacy to your home without sacrificing natural light. This kind of glass is coloured or engraved with a pattern that blocks the view while letting light through. Windows used to be rather uniform in design, but these days you can choose from a wide range of design and performance options to suit the requirements and tastes of your clients.

WHAT ARE YOUR GLAZING OPTIONS?

Energy-saving glass

At the forefront of performance driven glass to reduce energy consumption and increase thermal comfort, Glassworks are proud to have a range of the most advanced glass technologies with proven performance figures that are second-to-none.

Good

EnerSave® Insulating Glass Units
Customised IGUs for a variety of applications in various colours and thicknesses.

EnerSave® Plus Low-E IGUs
A range of versatile IGUs with various Low-E pyrolytic coatings or acoustic laminates.

Better

Optitherm® clear double glazed
A super clear and insulating low-E perfect for colder climates at the perfect price point.

LoE-i89® clear single or double glazed
A smoother and clearer low-E glass able to be single or double glazed.

Best

LoÈ³-366® clear double glazed
A neutral-coloured triple silver low-E offering the ultimate balance of year-round thermal comfort and visibility.

LoÈ³-366® (2) + LoE-i89 (4) double Low-E double glazed
A clear double low-E double glazed unit with unrivalled solar control and insulation

Balancing performance with visibility

If Energy-saving glass is a H2, this is a H3 as it is related to the concept of glass performance. Keeping in mind that lower is better when it comes to SHGC and U-Values, the below table paints a picture of the type of performance offered as you make your way through the options.

Another thing to consider is the Light to Solar Heat Gain ratio (LSG). It is no good letting in copious natural light if the room becomes overheated as a result. Similarly, it is no use having super-low SHGC and U-Values if the lighting is poor as is the case with a dark tint. Thankfully, sophisticated coated glass products offer a high LSG ratio, the perfect balance between solar control and lighting

The LSG ratio is calculated by dividing the VLT by the SHGC. If the ratio is greater than 1.0, the window transmits more light than heat. As a general rule of thumb, a LSG value of >2.0 is desirable.

	Single glazed 6mm clear	**Double glazed uncoated** 6/12/6 clear	**Optitherm double glazed** 6/12/6 clear	**LoE-i89 double glazed** 6/12/6 clear	**LoE-366® double glazed** 6/12/6 clear	**LoE-366 + i89® double low-e** 6/12/6 clear
SHGC	0.82	0.71	0.56	0.63	0.27	0.26
VLT	88%	78%	78%	77%	62%	61%
U-Value	5.8	2.5	1.4	1.6	1.3	1.1
LSG	1.07	1.09	1.39	1.22	2.29	2.35

Security laminated glass

Glassworks' Dandenong facility is home to one of the most sophisticated laminating lines in Australia able to produce a variety of custom laminated glass panels according to customers' specific needs – security, structural and performance ratings.

ArchiLam® Security Laminated Glass is a customisable laminated security glass incorporating robust interlayers for superior security and indestructibility. The laminates are toughened and/or heat strengthened and double glazed, making them ideal for residential windows and doors, as well as shops and businesses wanting to keep their premises safer from intrusions.

Decorative glass

Glassworks source the latest European products and custom manufacture a variety of other unique decorative glass products for residential and commercial applications. The range includes custom laminated glass, patterned glass, and satin-etched glass.

About Glassworks

Glassworks is an Australian-owned glass processing operation that utilises the best technology and machinery from around the world to provide innovative, customised glass solutions to the Asia Pacific region with over 90% of all materials sourced locally.

Committed to innovation in design and glass that contributes to a buildings' overall sustainability performance, the company's main areas of focus are performance driven glass and decorative glass with processing capabilities such as laminating, toughening and customisation

REFERENCES

1 Department of Energy. “Window Types and Technologies.” Energy.Gov. https://www.energy.gov/energysaver/window-types-and-technologies (accessed 6 March 2023).

2 Australian Glass and Window Association. “Your Home Guide to Glazing.” AGWA. https://awa.associationonline.com.au/wersnews/your-home-guide-to-glazing (accessed 6 March 2023).

3 Victoria State Government. “Home window glazing.” Sustainability Victoria. https://www.sustainability.vic.gov.au/energy-efficiency-and-reducing-emissions/building-or-renovating/windows-and-shading/window-glazing (accessed 6 March 2023).

4 Renew Australia. ”Glazed windows and doors.” Renew. https://renew.org.au/resources/how-we-can-help/sustainable-home-design/windows-and-glazing (accessed 6 March 2023).

All information provided correct as of March 2023

GLASSWORKS