

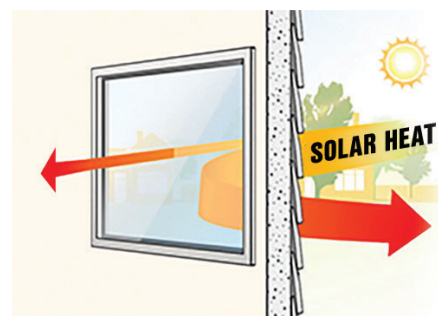
7 Star Glazing Solutions for Windows and Glass Doors

With the next set of the trajectory improvements now underway from the National Construction Code 2022 (NCC), Australian Glass Group (AGG) were confident of making just one building change, in your glazing, as an easy compliance option to the heightened energy efficiency requirements. AGG commissioned a comprehensive 7 Star analysis from an established and experienced energy rater to confirm this, and these are the findings...

Firstly, it is important to understand the reason why a change in your glazing can play such a significant role, and the reason is to do with heat. If you think of heat as two different types, this will explain it best:

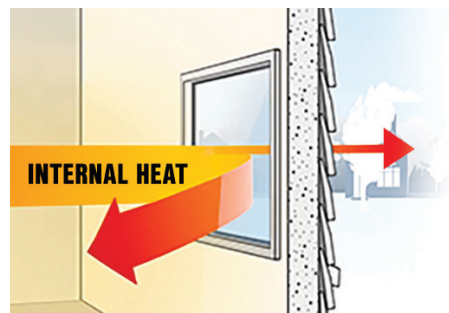
Type #1 Heat is heat from the Sun, aka. Solar Heat and Passive Heat. This comes straight from the Sun and can enter our buildings through our glazing. While we need natural light entering inside, we must be aware of overheating due to unwanted solar heat gain. This heat is linked to the Solar Control properties of our Glazing and is where the Total System - Solar Heat Gain Coefficient (SHGC) value of our glazing comes in – a measure to calculate how much of this solar heat enters inside through the glazing.

As an example, an SHGC of 0.87 is basically stating 87% of solar heat enters inside the building, and so 13% is blocked, while an SHGC of 0.27 is stating that only 27% solar heat gain, and so 73% is blocked. The lower the SHGC, the less overall solar heat gain through the glazing.



Type #2 Heat is all other heat generated here on Earth; body heat, heaters, heat pumps, HVAC systems, fireplaces. This heat has a longer electromagnetic wavelength signature compared to Type #1 Heat. This heat is linked to the Insulation properties of our Glazing and is where the Total System - U-Value of our glazing comes in – to measure how much of this non-solar heat passes through the glazing.

As an example, a glass-only U-Value of 4mm Clear regular glass single glazed is 5.9 (which provides no reliable Insulation at all), while the U-Value of a 4/12/4 regular double glazed unit with regular 4mm Clear glass is 2.7 – over 100% better insulation compared to single glazed thanks simply to the trapped air gap. From here we can add a gas like argon to further help the insulation properties and also LowE coatings to supercharge even more insulation. The lower the U-Value, the less non-solar heat loss passes through, meaning the better the Insulation.



Now that you understand the two types of Heat and what SHGC and U-Value are, note that **“Up to 40% of a Home’s heating energy can be lost and up to 87% of its heat gained through its glazing”** - yourhome.gov.au. This is why SHGC and U-Value play such a significant role in a buildings Energy Efficiency, so much that these two performance factors are singled out and identified with dictated minimum performance in every home or commercial building we make in Australia.

The NCC 2019 improvements focused on Volume 1, Commercial buildings and this established higher performing glazing to be required to comply with the reduced total energy it could now use. The result has been that windows and glass doors with much lower Total System SHGC and U-Values are required to comply. It is now time for Volume 2, Residential homes (and apartments), under NCC 2022, specifically under the Energy Efficiency section of the code. Ideally, the plan from the ABCB was to turn towards a 7 star minimum NatHERS built home (Nationwide House Energy Rating Scheme), however each State and Territory had the right to challenge, delay or even completely reject the changes...

As per the time of this writing, QLD, NSW, ACT and VIC have all accepted the relevant Energy Efficiency section - as is - and the changes are now in effect for all new build

Residential built homes. NT has also adopted the section, however limited to a 5 star minimum home structure. SA will adopt on 1 Oct 2024 while WA has disappointingly pushed it out until 1 May 2025... and TAS has completely rejected this section altogether!

AGG specialises in high performance Insulated Glass Units (IGU), and these can be either double glazed or triple glazed units. They operate in, and service, south-east Australia - from NSW down to TAS, where IGU is required more than other parts of the country. AGG commissioned a comprehensive 7 Star analysis that included over 9,000 individual energy rating simulations to identify what glazing was required to achieve minimum 7 Star compliance in these areas. To do this accurately, multiple factors were taken into consideration and locked in, then only changing the glazing to find a compliant solution.

1. Climate

NatHERS divides Australia into 69 different climate zones, all with updated climate files to be more accurate, as well as identify extreme climates – eg. areas that see very cold winters but also very hot summers. All 69 climate zones come with maximum energy levels it can use, per star band (1-10), that the home can use in MJ/m2.annum. As most of the country moves to a 7 star minimum home, we reduce that total MJ value, forcing the home to be more Energy Efficient.

The World Health Organization (WHO) recommends houses maintain a minimum inside temperature of 18 degrees Celsius for healthy living. Where you build your home plays a big role in the demand of your glazing to help maintain this healthy inside temperature, all year round:

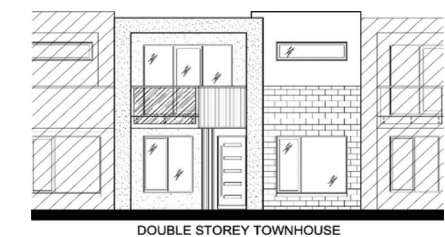
- Warmer climates use more energy to artificially cool and so rely more on a glazing’s Solar Control properties – specifically a lower SHGC.
- Cooler climates use more energy to heat and so rely on a glazing’s Insulation properties – specifically a lower U-Value.
- Moderate climates use a balance of energy to both heat and cool and so rely on a glazing’s balance of both SHGC and U-Value, but nowhere near the levels of warmer or cooler climates.

AGG modelled five climate zones for its analysis; East Sydney, West Sydney, Canberra, Melbourne and Hobart.

2. Building Type

Three home types were modelled in each climate zone:

1. Single Story Detached Home.
2. Double Story Semi-Detached Home (Townhouses).
3. Double Story Detached Home with the largest footprint and amount of Glazing used.



3. Building Design

- The Orientation to North facing can play a big role, we averaged all orientation to be conservative as not all homes have the ability to position the most efficiently on a plot of land.
- The foundation type can make a difference - we modelled using common waffle slabs.
- Building materials play a role – what they are, colours, performance (eg. R-Value 2.5 wall insulation, R-Value 5.0 Ceiling insulation).

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- External shading and eaves length’s.
- How many glazing units the home has, and their sizes.
- How big the inside cubic area to heat and cool is – eg. a separate lounge that can be closed off vs. open plan living.
- Glazing – we started with standard single glazed 4mm glass in standard aluminium frames...

Results for House Type #1 - Single Story Detached (most cost-effective solutions):

- East Sydney, being a warmer climate, could get away with single glazed glass in standard aluminium frames, however not with clear glass. It required lower SHGC and so a Grey tint was required.
- West Sydney, being a colder climate, required standard double glazing, in aluminium frames.
- Melbourne, Canberra and Hobart all required LowE coated double glazing, in aluminium frames.

Results for House Type #2 - Double Story Semi-Detached Townhouses (most cost-effective solutions):

- East Sydney, just like house type #1, Grey tinted single glazed glass in standard aluminium frames.
- West Sydney, Melbourne, Canberra and Hobart all required standard double glazing in aluminium frames.

Results for House Type #3 - Double Story Detached (most cost-effective solutions):

- All five areas simulated required not only double glazing, but also a LowE coating added, and higher performing frames over and above aluminium frames – this includes thermally broken aluminium, uPVC or timber frames.

- this is due to the key factors of these larger homes having the most amount of glazing, with bigger sizes of glazing and larger cubic area of inside volume to heat and cool, often seen as open plan living.

Summary

While the changes in the Energy Efficiency section of the NCC 2022 are significant increases that result in an increased dependence of higher performing glazing, if we compare this to the rest of the developed world, we will see that Australia is still far behind other countries in terms of our windows and glass doors. However, AGG see the NCC improvements as a great step forward.

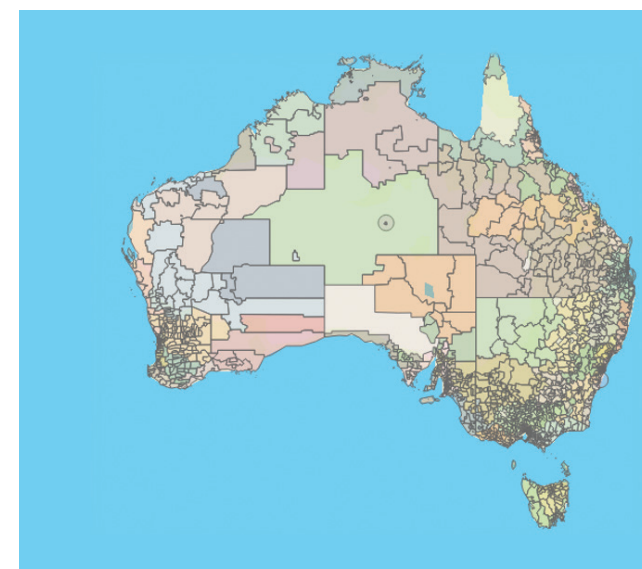
On top of compliance to the new codes and the resulting reduction of energy used and operating carbon released, don’t forget that we build these homes for Human Beings - higher performing glazing bring more comfort, health and wellbeing to those Australians living the majority of their lives inside these buildings. And 7 star is minimum, we can always build better.

The level of quality and performance from our glazing is now increasing and AGG, like many other locally made suppliers, have been preparing for this and have the capacity, product range and back up support required for your project’s needs.

AGG has a detailed White Paper on the full NCC 2022 analysis and also conduct a 1x formal point CPD presentation on this subject. Email specify@agg.com.au for more information.



(editorial content supplied by Michael Ward of the Australian Glass Group).



Key:	#1 Single Story Detached	#2 Double Story Townhouse	#3 Double Story Detached
SG = Single Glazed DGU = Double Glazed Unit Higher Performing Frame examples = Thermally Broken Aluminium, Timber, uPVC			
East Sydney (Postcode 2000)	+ Regular SG Aluminum Frames	+ Regular SG Aluminum Frames	LowE
West Sydney (Postcode 2750)	+ Regular DGU Aluminum Frames	+ Regular DGU Aluminum Frames	+ Higher Performing DGU Frames
Melbourne (Postcode 3000)	LowE + Regular DGU Aluminum Frames	+ Regular DGU Aluminum Frames	LowE + Higher Performing DGU Frames
Canberra & Hobart (Postcodes 2600 & 7000)	LowE + Regular DGU Aluminum Frames	+ Regular DGU Aluminum Frames	LowE + Higher Performing DGU Frames