

Section J and commercial building facade design: NCC 2022

Michael Shaw



Cover image. Thomas Dixon Centre, Brisbane, by Conrad Gargett. Traditional land owners: Yuggera and Turrbal people (Image: Christopher Frederick Jones)

Abstract

Section J of the National Construction Code (NCC) Volume One codifies minimum glazing thermal performance measures for both facade vision glazing and roof lights.

NCC 2019 contained the first major revision to the Section J measures in nine years. A significant change was the amalgamation of the external wall insulation requirements with facade glazing requirements into a new Part J1.5 in NCC 2019. This is now called Part J4D6 'Walls and glazing' in NCC 2022. This requirement in the code accounts for the significant detrimental effects of thermal bridging through metal framing within wall construction.

The continuing difficulty with Section J is that it fails to explain succinctly to a designer what a compliant design might look like. This paper attempts to address this failure by presenting a range of strategies and design charts for different climate zones to enable building designers to quickly design high-performance, NCC-compliant facade concepts.

This note updates and replaces Acumen Environment Issue 04 October 2019 (edited April 2020) NCC 2019 Section J and Commercial Building Facade Design to reflect the minor commercial energy efficiency changes introduced into NCC 2022. Transition arrangements apply in some states and territories where NCC 2019 Section J clauses can still be used beyond the NCC 2022 adoption date of 1 May 2023. Refer to [your jurisdiction's building authority for the relevant state and territory adoption dates](#).

Introduction

The Australian Commonwealth government has international obligations to facilitate a national greenhouse gas emission reduction of 43% on 2005 levels to meet its Paris Agreement targets for the year 2030 (Australian Government Department of Climate Change, Energy, the Environment and Water 2022). These targets aim to reduce the potential risk of detrimental effects from anthropogenic climate change.

One of the least costly ways of lowering emissions is through the setting of minimum building energy efficiency standards, written into building regulations. These regulations for Australian commercial buildings are contained within Section J of the NCC Volume One.

A key part of a building's energy efficiency response is facade design, involving location of glazing and associated external shading. By manipulating the orientation of a conceptual building plan and placing shading and glazing in relation to local sun paths, an architect can make a considerable difference to occupant comfort and the building's operating energy consumption. This in turn has a large impact on the building's whole-of-life greenhouse gas emissions footprint.

Unlike residential buildings, commercial buildings generally have high internal heat loads from occupants, lighting and equipment. Often there are no ventilation openings that would allow that internal heat to dissipate naturally during mild external conditions, so the internal heat built up needs removal using energy consuming air-conditioning to maintain internal comfort conditions for occupants.

To address the potential problem of air-conditioning energy use in response to excessive heat gain or loss, NCC 2022 Section J continues the same minimum glazing thermal performance measures for facade vision glazing that were first introduced into NCC 2019.

A good understanding of Section J and passive design principles can lead to a thermally efficient building with sufficient opportunities for external views and daylight entry.

In the NCC 2022 (ASCB 2022) Volume One Section J (as per NCC 2019), there are three stringency levels applying to wall-glazing for commercial and some residential building types:

1. Nighttime-use buildings such as hotels and accommodation for people with disabilities (Class 3), aged-care buildings (Class 9c) and ward areas of healthcare facilities (Class 9a);
2. Display glazing in Class 6 shops or Class 7 showrooms; and
3. All other non-display glazing in daytime-use buildings Classes 5 through to 9b, such as office buildings, retail premises and showrooms, warehouses, laboratories, manufacturing facilities, public assembly buildings such as schools and community centres, and non-ward areas of healthcare buildings. Common areas of Class 2 (attached residential apartment buildings) are also included.

Section J still fails to provide designers with glazing design information in a user-friendly format. This paper sets out to assist designers to better understand the impacts of window thermal performance, aspect and shading on the maximum proportion of glazing permitted on external facade walls for building code compliance.

Key concepts

In order to design innovative, high-performance, NCC-compliant facade concepts, it is essential that designers grasp five key concepts (also see the [Glossary of Terms](#) at the end of the paper):

1. Passive design
2. Wall-glazing area
3. Glazing thermal performance
4. P/H sun-break shading ratio
5. Performance Solution versus Deemed-to-Satisfy (DTS) compliance

Passive design

Passive design is 'an integrated building design approach which considers a building's orientation, layout, form and materials with respect to climatic conditions to maintain thermal comfort and reduce operational energy requirements' ([Environment glossary](#), Australian Institute of Architects 2021).

Passive design for non-residential buildings differs in important respects from residential passive design. The most apparent difference is the presence of larger internal heat loads that must be removed to achieve occupant thermal comfort for much of the year.

These heat loads come from higher occupant densities, electric lighting and heat-generating equipment and appliances. Non-residential buildings typically have higher lighting requirements for work-related visual tasks than residential buildings.

The need to avoid solar gain in most non-residential buildings is generally far greater than the need to capture it for passive winter heating in cooler Australian climate zones.

These higher internal loads result in non-residential buildings (like offices) typically using more energy in cooling annually for a given floor area than residential buildings.

As with residential design for some Australian climates, east-facing and west-facing glazing should be reduced or used sparingly, as treating these aspects to limit sun entry in warm weather is difficult. As far as possible, the building's glazing should also be oriented to face true or solar north, to allow optimised control of sun ingress by adopting external horizontal shading devices on the north. (Refer *Acumen* note [Residential Passive Design for Temperate Climates](#).)

Wall-glazing area

Both NCC 2019 and NCC 2022 Section J require that facade glazing and external wall thermal performance are assessed together. The NCC 2022 Part J4D6 'Walls and glazing' (Part J1.5 of NCC 2019) combines glazing thermal performance requirements with insulation requirements for opaque wall elements. Less stringent U-values apply to display glazing, whose area is excluded from the rest of the wall-glazing compliance

calculation. Opaque non-glazed openings such as doors, vents, penetrations and shutters are also excluded from the facade area. The extent of the facade contributing to the wall-glazing area of a single level of a conditioned space is described in Figure 1 below.

Differing for both climate zone and daytime versus nighttime-use building types, the wall-glazing rules are written to limit the following:

- Maximum average U-value for conduction of all wall-glazing systems;
- Maximum solar admittance for all wall-glazing systems (differs for each aspect); and
- Minimum backstop insulation R-value for opaque elements in the wall-glazing systems (which differs for aspect glazing proportions depending on whether the WWR is above or below 20%) (ABCB 2022).

Nighttime-use building types include Class 3 accommodation buildings such as hotels/hostels, Class 9a healthcare ward areas and Class 9c aged care facilities. Daytime-use building types include common areas in Class 2 apartment buildings, Class 5 offices, Class 6 retail, Class 7 warehouse, Class 9a healthcare non-ward areas and Class 9b public buildings.

Wall-glazing calculations assess compliance of the four principal aspects (north, east, south and west) known in earlier versions of Section J as orientations. Wall-glazing compliance for each aspect is assessed by calculating an average across all levels of the building. Conduction (U-value) and solar gain (solar admittance) are assessed independently in the NCC 2019 and NCC 2022. In many instances, the maximum average total U-value will limit the window area on a given aspect. In other situations, the solar admittance will be the critical variable governing the window area allowance.

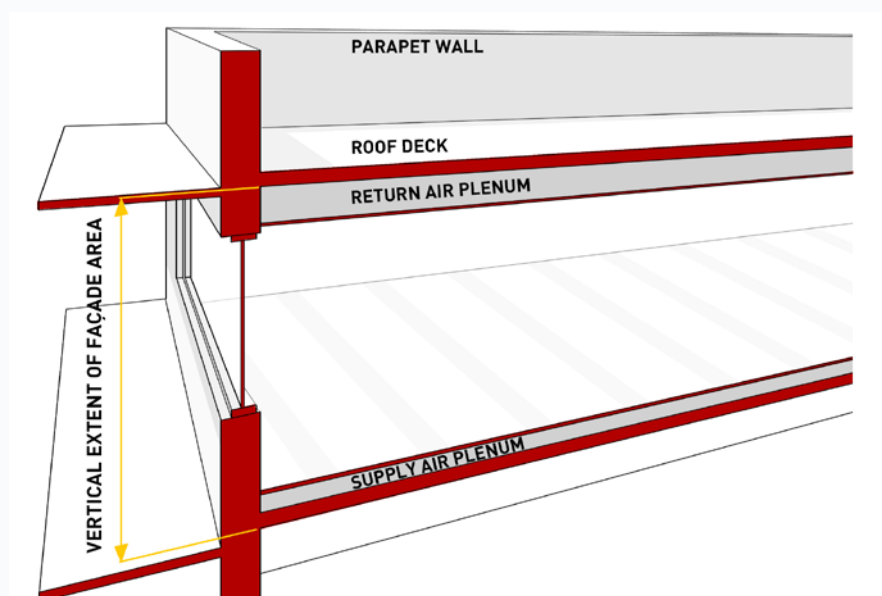


Figure 1. Wall-glazing area illustration for use with the ABCB facade calculator (Image: Noy Hildebrand, based on sketch by author)

To meet the DTS requirements, this assessment can be conducted for each aspect separately (Method One) or in a combined all aspect wall-glazing compliance calculation (Method Two). In the latter method, the U-value and solar admittance calculations for all aspects using Method One are area-weighted and combined. A solar admittance weighting coefficient is applied to each of the four aspects for the combined solar admittance in the Method Two calculation. For instance, in Climate Zone 6, in daytime use building for glazing that is not considered retail display glazing, the solar admittance of the north aspect is weighted 2.12 times that of the south aspect.

Method One is useful for very preliminary calculations to confirm the compliance of an initial facade concept. Method Two however can permit greater design flexibility than that permitted under the separate aspect by aspect compliance approach of Method One. Method Two effectively allows some trading of glazing area allowance between aspects and is best used to assess compliance once the design of all elevations is fixed. Method Two will better accommodate designs where a uniform appearance is preferred with the same wall-glazing design on all aspects. Method Two allows greater glazed areas on some aspects than Method One if other aspects have little glazing. In practice, the greater design flexibility offered by Method Two results in Method One never being used.

Glazing thermal performance

The area of each glazing element (excluding display glazing) in the building's thermal envelope must be entered into the wall-glazing facade calculator. This glazed area input includes the area of the framing projected onto the same plane as that of the glazing of the window frame or glazed door frame. The Solar Heat Gain Coefficient (SHGC) and U-values (the ease with which heat conducts through a building element) entered into the glazing calculation are the Total System values for each glazing element. This means that the values must include the thermal performance of not just the glazing but also any associated frame. Glazing-only SHGC and U-values obtained from glazing manufacturers must therefore be adjusted to account for the thermal bridging effect of the window frame on the total window assembly.

Indicative ranges of Total System U-Value and Total System SHGC are published in NCC 2019 Amendment 1 Volume Two 3.12.2.1 External Glazing. The [Australian Glazing Association's Window Energy Rating Scheme \(WERS\) website](#) provides an extensive searchable database of windows and glazed doors for commercial buildings. Indicative values for total U-value and total SHGC for different glass and frame choices can be obtained from this website for use in wall-glazing compliance calculations. These values however are based on standard window sizes and configurations that may differ to what is being installed. More accurate calculations of performance can be made using Australian Fenestration Rating Council (AFRC) approved software packages such as THERM and WINDOW (software developed by the US Department of Energy through the Lawrence Berkeley Lab).

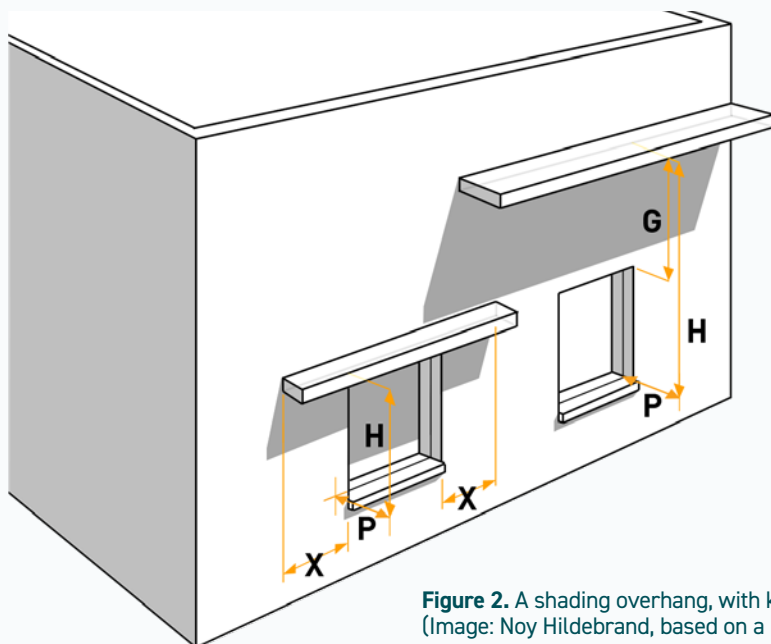


Figure 2. A shading overhang, with key dimensions illustrated.
(Image: Noy Hildebrand, based on a modified sketch by author).

P/H (Sun-break shading ratio)

The sun-break ratio, represented by P/H, relates to overhangs that shade glazing. P is the horizontal depth of the solid-shading device from the shadow-casting edge to the glazing line and H is the vertical distance from the shadow-casting edge of the shading device to the window sill (Figure 2).

To gain credit, the shading device must be solid for the full depth (P) and be completely opaque to the direct sun. As such, slats or tinted glass overhangs that allow some direct solar gain onto the glazing underneath are not credited in the facade calculator. The shading device must extend for a horizontal distance (X) that is equal to or greater than P on both sides of the window in order for the full projection distance (P) to be credited as compliant with NCC 2019 Section J Specification J1.5a Part 7 shading or NCC 2022 Specification 37.

Note. In the following facade-glazing graphs, (Figures 4 to 11) the shading device has a shadow-casting edge at the same level as the window head height (ie the height at G would be zero in Figure 2). Horizontal shading devices with casting edges above or below the window head height will yield different glazed-area allowances.

Performance Solutions versus Deemed-to-Satisfy (DTS)

Since the stringency of glazing thermal performance was increased in NCC 2019 Section J (and remains unchanged in NCC 2022), it is often difficult for designers to achieve DTS compliance and maintain competing design objectives including: adequate provision of external views, bringing in daylight, preferred roof sheeting colour, additional cost of installing thermally broken window framing and addressing street frontage. It is likely that for some building projects, designers will choose to comply with Section J via a Performance Solution.

The most direct way to comply with Section J of NCC 2019 or NCC 2022 is to demonstrate that the design meets all of the prescriptive DTS provisions. Competent design professionals can use the ABCB's facade calculator spreadsheet to assess compliance of a glazing and shading design against the relevant NCC 2019 or NCC 2022 wall-glazing DTS provisions (Part J1.5 and Part J4D6 respectively). An assessment will only be correct where the spreadsheet user fully understands the meaning of the inputs required. As mentioned elsewhere, U-value and SHGC entries in the facade calculator are for combined frame and glazing elements, not just the glazing manufacturer's listed glass-only SHGC and U-values.

Indicative ranges of Total System SHGC and U-values for typical glass and frame combinations in external glazing can be determined from the WERS website. These U-values and SHGC values can be used in the facade calculator because they are Total System values for the whole assembly. It is important to remember though that the WERS values are for standard window dimensions and configurations as set out in NFRC 100 Tables for window and glazed door products.

To gain full credit for the shading effect of the overhang P (Figure 2) in the wall-glazing calculation, any external shading overhangs must extend a minimum distance beyond the left and right edges of the window. The spreadsheet user must also understand the definition of wall-glazing area (as noted). Data for each of the four, principal wall-glazing facade aspects is input individually into the calculation, but for each aspect all floors of the building are combined. Method Two calculations then determine overall wall-glazing compliance for the four aspects combined.

Specification 38 in NCC 2022 'Spandrel panel thermal performance' (J1.5b in NCC 2019) provides an understanding of the realistic thermal performance of opaque sections of curtain wall facade construction. It recognises the potential for thermal bridging through metal framing to degrade the thermal performance of insulated spandrel panels in curtain-wall construction.

Designers who choose not to follow the prescriptive DTS compliance route in their design must offer a Performance Solution. The most commonly used Performance Solution compliance route in NCC 2022 is the Verification Method called J1V3 Verification using a Reference Building (referred to as JV3 in NCC 2019). This is often referred to as building energy modelling or building energy simulation (Parker et al, 2017). In this method, predicted annual building energy use is modelled via specialised computer software. This approach permits designers to demonstrate that their preferred design is less carbon intensive in operation than the DTS Reference Building design baseline. It gives the designer greater freedom – for instance, to employ more glazing than the DTS approach allows, providing that calculations show the proposed building design will have a lower carbon footprint in operation than that of the DTS Reference Building.

A building envelope's thermal performance is considered by the ABCB regulators to be an important component of building energy use, due to the envelope's anticipated longevity and long-term influence on building energy use (relative to other components like HVAC or lighting, which have shorter life spans). To reflect this

relative importance given by regulators, the NCC 2022 J1V3 (NCC 2019 JV3) method dictates that all buildings are to achieve minimum standards of building envelope thermal performance, at least as energy efficient as that of the DTS Reference Building.

The important thing for designers to remember at the early concept stage is that if the DTS provisions are exceeded in some wall-glazing aspects, other major aspects may be well within compliance. Through the energy modelling calculations in a J1V3 (NCC 2019 JV3) solution, unused glazing-area allowances (or thermally compliant portions of facades) are effectively traded across the building to compensate for parts of the design that exceed DTS glazing requirements. Improved insulation levels can also form part of a J1V3 (NCC 2019 JV3) Performance Solution.

In NCC 2019, two new verification methods (NABERS Commitment and Green Star) were introduced which use annual operational energy greenhouse gas emissions rather than delivered energy to establish compliance. In NCC 2022 these have been renamed and the building types extended for the NABERS compliance path to include Class 2 (apartment building landlord areas), Class 3 (hotels) and Class 6 (shopping centres with gross floor areas greater than 15,000 m²) in addition to the existing NCC 2019 NABERS compliance path for Class 5 (office buildings):

- J1V1 NABERS Energy: for Offices (NCC 2019 JV1) this requires a minimum 5.5-star base building Commitment Agreement (CA), for Apartment Buildings this requires a minimum 4 star CA, for Hotels this requires a 4 star CA, for Shopping Centres this requires a minimum 4.5 star CA; and
- J1V2 Green Star (NCC 2019 JV2): this requires that the Performance Solution emits no more than 90% of the greenhouse gas emissions of the Reference Building (ABCB 2022).

These compliance approaches reduce the number of calculations required from design teams to demonstrate minimum code compliance for projects that are already aiming for voluntary or local government required best practice ratings.

Window-to-wall ratio limits

Section J attempts to codify good passive design by rewarding optimised glazing orientation for each climate zone. Understanding the effectiveness of shading and the impact of glazing selection for each aspect will help designers to orient their buildings on the site and to locate external glazing where it will be easiest to achieve a higher window-to-wall ratio (WWR) if that is desired.

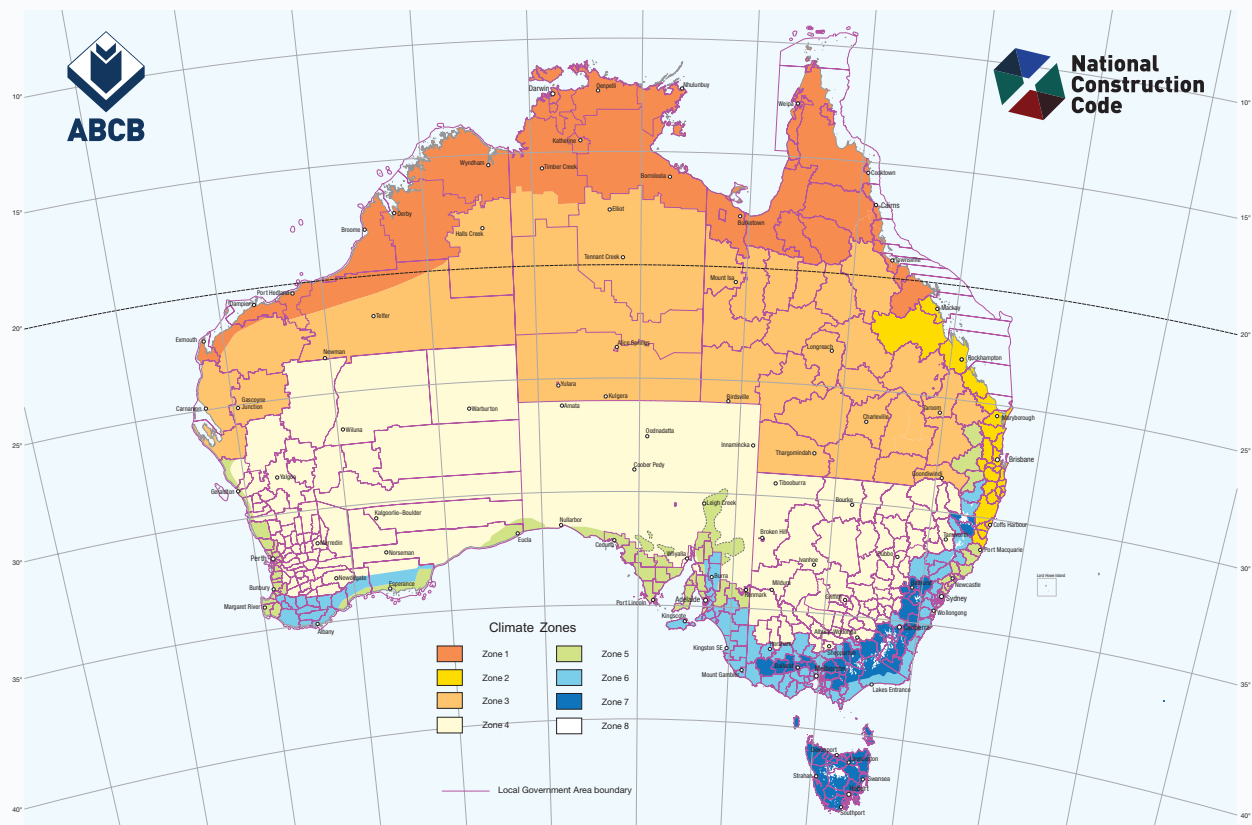


Figure 3. Climate zone map: Australia. (Source: Australian Building Codes Board (ABCB) 2019 (last amended August 2015), CC BY-ND 4.0)

In this paper, the wall-glazing regulations in Section J have been analysed to determine the benefit of different glazing/shading strategies in each of the eight climate zones (Figure 3). The glazing strategies tested include different values for shallow and deep external overhang depths (expressed as the sun-break ratio, P/H), high, medium and low glazing system U-values and high, medium and low SHGCs. The output of the tests is expressed in terms of the maximum allowable values

for WWRs and the proportion of external glazing on a facade enclosing the conditioned space of a building.

Graphs of allowable WWRs as percentages are presented in Figures 4 to 11 to assist designers in determining compliant glazing proportions for their facade designs for the two main stringency levels (daytime-use and nighttime-use spaces).

Graphs

Guide to using graphs (Figures 4 to 11)

In each graph, the vertical axis describes the maximum allowable WWR based on minimum R-values being adopted for opaque facade elements. In order to increase allowable WWRs to practical levels for nighttime-use buildings in some climate zones, the minimum R-value has been increased beyond the backstop value. The higher minimum R-values adopted are those prescribed in NCC 2022 Table J4D6a (Table J1.5a in NCC 2019) where opaque wall areas comprise 80% or more of the facades. This is denoted by the label ‘^Rw’ on the graphs. The horizontal axis lists the four solar aspects, followed by three solutions for Method Two (M2) – multiple aspects.

The three specific cases explored for Method Two are:

1. Square building floor plan with equal facade areas for all aspects (M2 Sq);
2. Floor plans with width to length ratio 2:1 long in the north-south axis (M2 N-S); and
3. Floor plans with width to length ratio 2:1 long in the east-west axis (M2 E-W).

For each graph, the designer will need to decide which glazing U-value is acceptable and economic for the project, as the wall-glazing conduction limiting calculation (shown as dotted black lines) may limit achieving the maximum WWR for any SHGC and shading overhang combination.

Chart colours used for the WWR graphs are set out in Table 1 below. Refer worked [example of a glazing concept using the WWR graphs](#).

Sunbreak ratio (below)	SHGC=0.60	SHGC=0.45	SHGC=0.30
P/H=0, unshaded	orange	light blue	light green
P/H=0.4	burnt orange	medium blue	medium green
P/H=0.8	dark brown	dark blue	dark green

Table 1. Graph chart colours

Climate Zone 1

Locations: Darwin, Townsville, Cairns

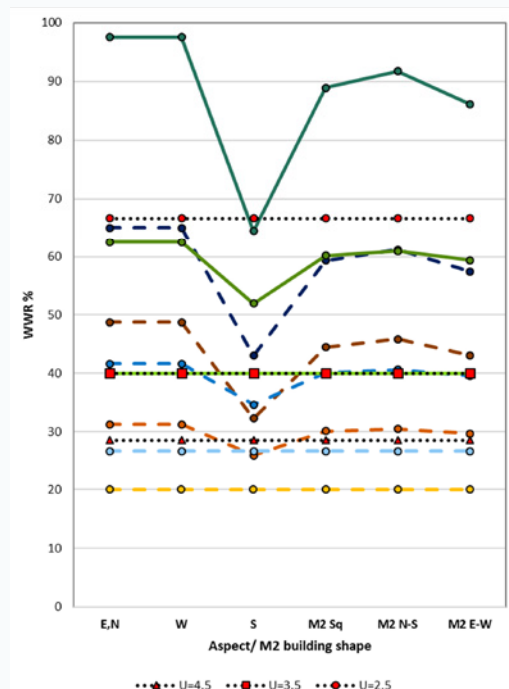


Figure 4a. Daytime use (excludes display glazing)

For Climate Zone 1, in Figure 4a the vertical axis shows the allowable WWR for all daytime-use commercial building spaces except display glazing. In Figure 4b, the vertical axis shows the allowable WWR for all nighttime-use commercial building spaces except display glazing.

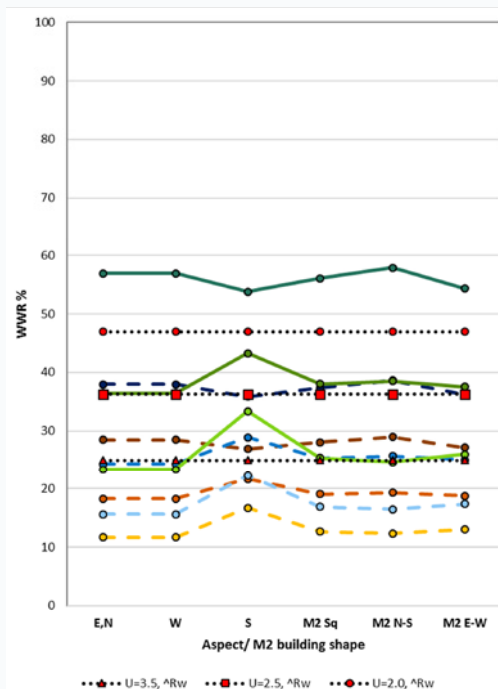


Figure 4b. Nighttime use (excludes display glazing)

Climate Zone 2

Locations: Mackay, Rockhampton, Brisbane, Coffs Harbour

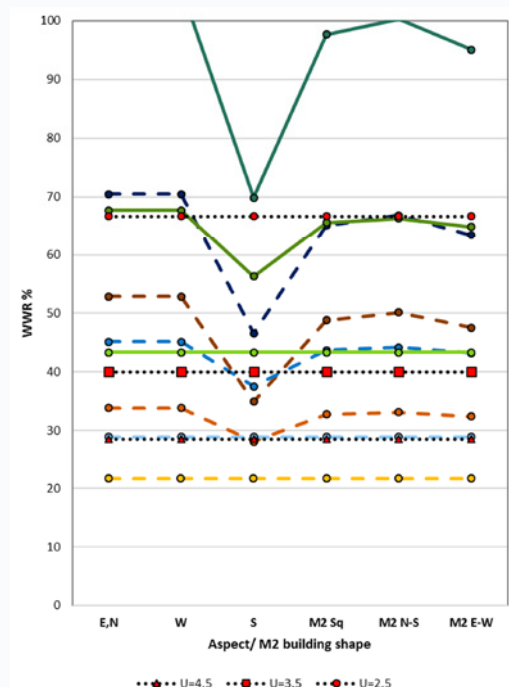


Figure 5a. Daytime use (excludes display glazing)

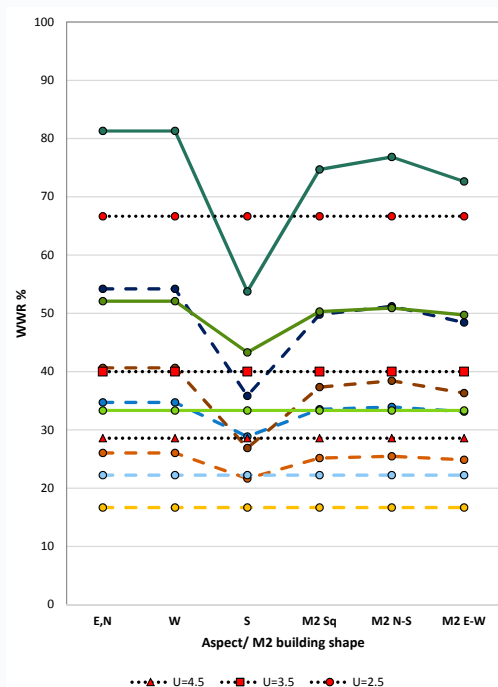
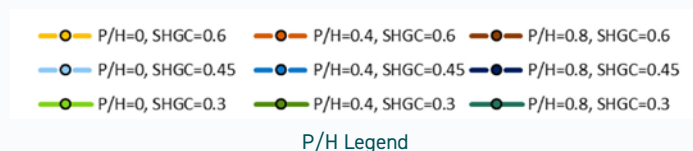


Figure 5b. Nighttime use (excludes display glazing)



Climate Zone 3

Location: Alice Springs

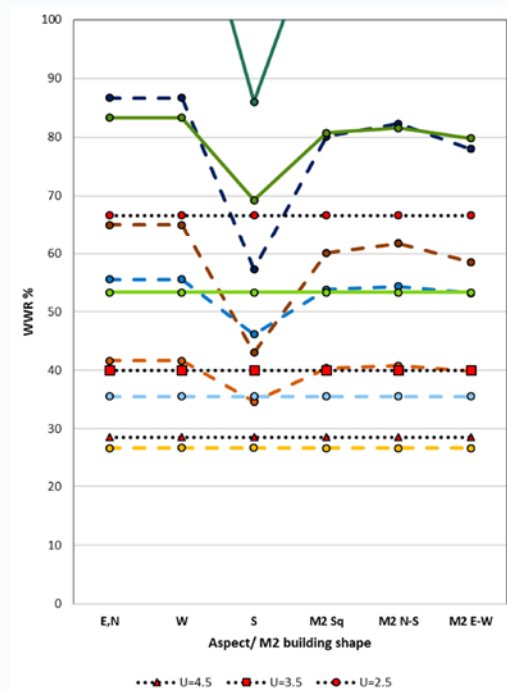


Figure 6a. Daytime use (excludes display glazing)

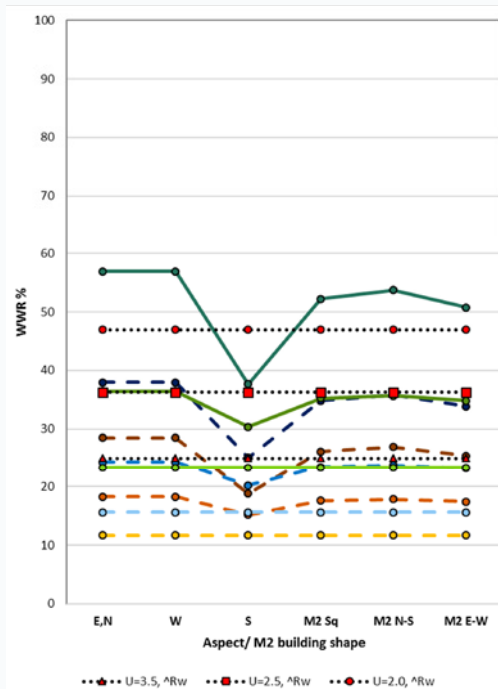


Figure 6b. Nighttime use (excludes display glazing)

Climate Zone 4

Locations: Mildura, Albury-Wodonga, Dubbo, Kalgoorlie-Boulder

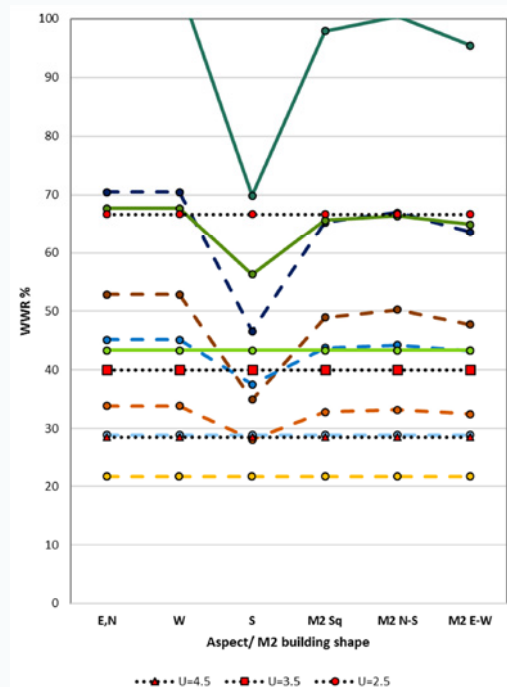


Figure 7a. Daytime use (excludes display glazing)

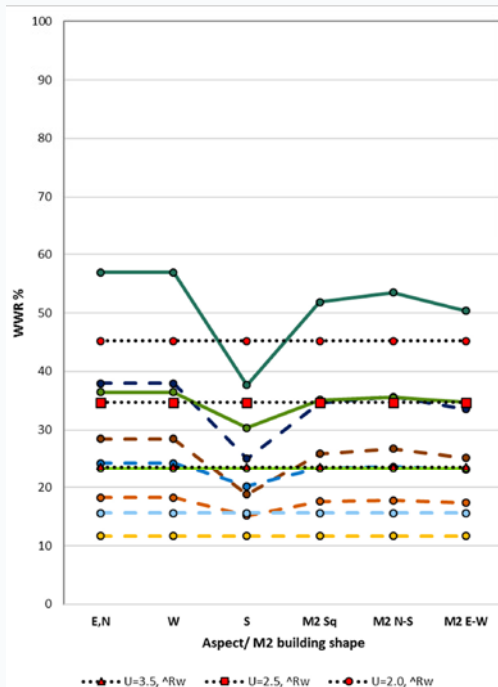
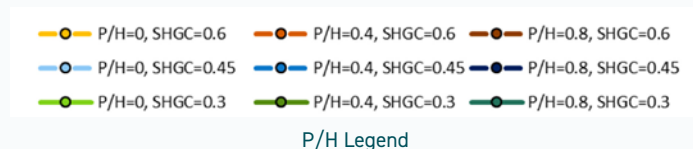


Figure 7b. Nighttime use (excludes display glazing)



P/H Legend

Climate Zone 5

Locations: Sydney coastal, Newcastle, Adelaide coastal, Perth

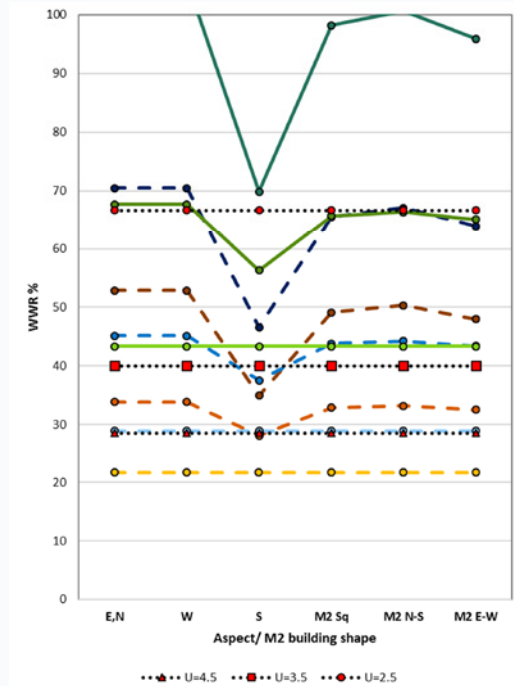


Figure 8a. Daytime use (excludes display glazing)

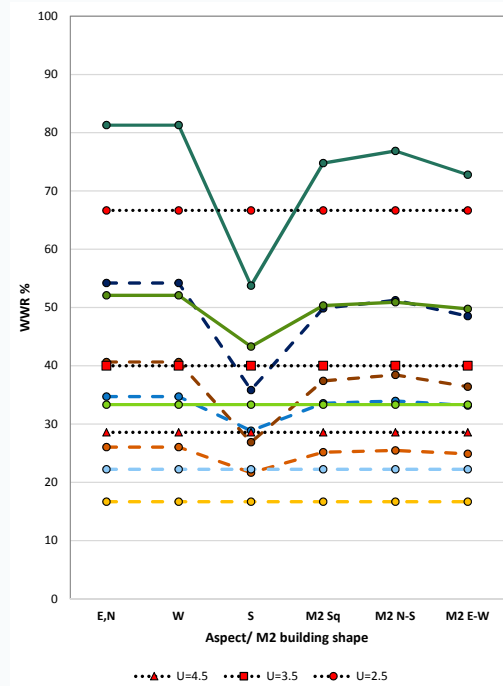


Figure 8b. Nighttime use (excludes display glazing)

Climate Zone 6

Locations: Melbourne, Sydney west, Adelaide Hills

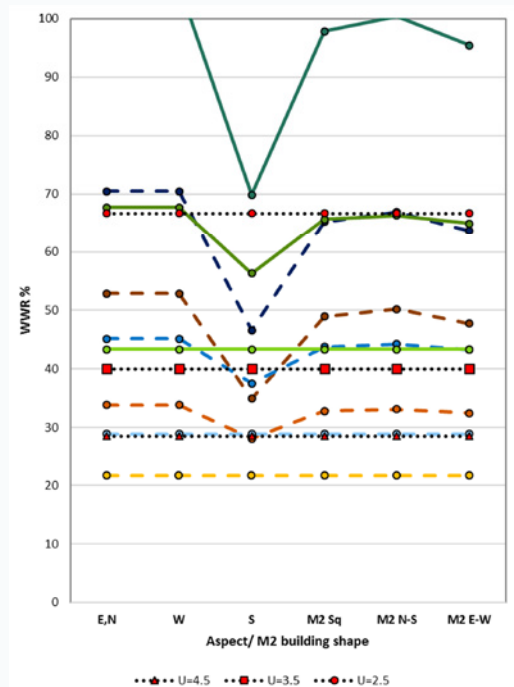


Figure 9a. Daytime use (excludes display glazing)

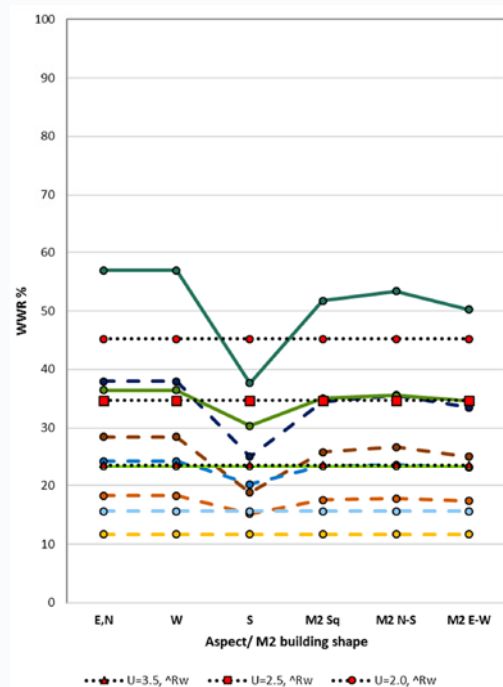
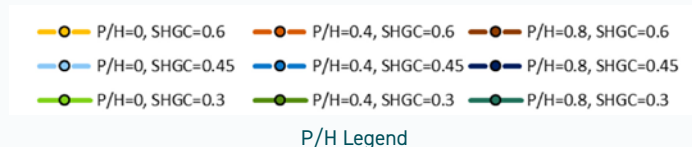


Figure 9b. Nighttime use (excludes display glazing)



P/H Legend

Climate Zone 7

Location: Hobart, Canberra

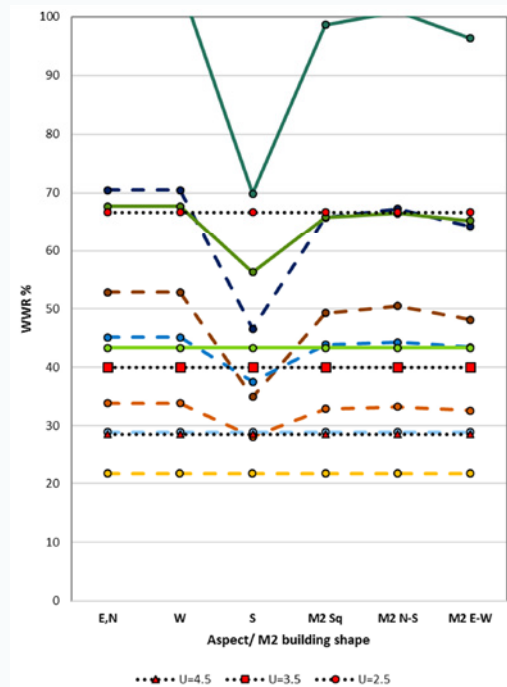


Figure 10a. Daytime use (excludes display glazing)

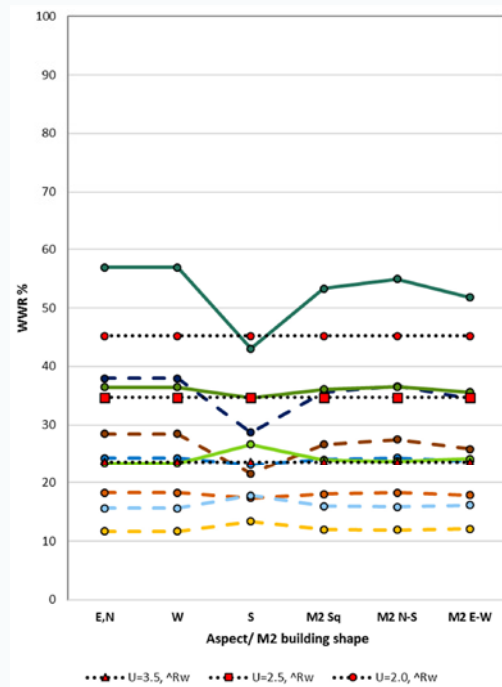


Figure 10b. Nighttime use (excludes display glazing)

Climate Zone 8

Locations: Alpine regions (above elevation 1200m on Australian mainland or above 900m in Tasmania)

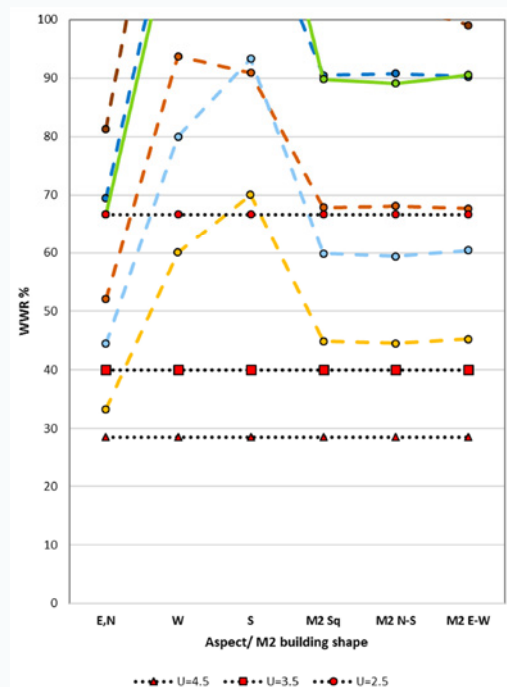


Figure 11a. Daytime use (excludes display glazing)

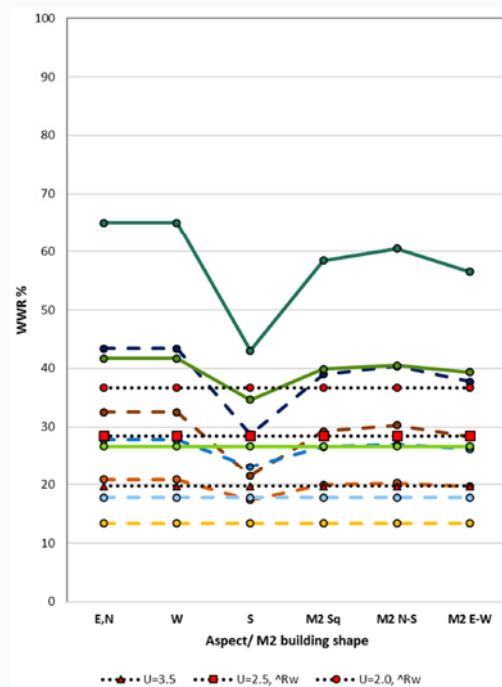
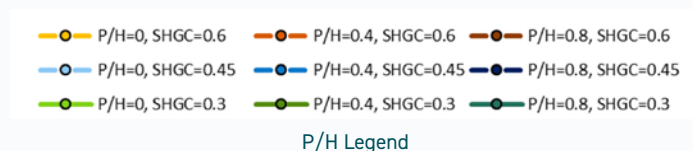


Figure 11b. Nighttime use (excludes display glazing)



P/H Legend

Example of a glazing concept using the WWR graphs

Facade (floor to roof) height	3.6m
Floor to ceiling height	2.7m
Supply air plenum height	0.3m
Return air plenum height	0.6m
Sill height above floor level	0.9m
Continuous strip window height above sill	1.8m
Shading overhang P	1.8m from the glazing line
Shading overhang H	2.4m above the window sill
Shading height G	0.6m above the window head height
Facade aspect	North

Table 2: Facade and window dimensions for the top floor of a class 5 (office) building located in Climate Zone 5 (Refer geometry in Figure 1; refer Figure 2 for P, H and G descriptions)

Using the example building described in Table 2 above, the following steps outline how to use the relevant graph to quickly ascertain the glazing thermal specification required to comply with the Method One DTS aspect-by-aspect provisions:

Assumptions

- Based on the strip window running the length of the northern facade, the WWR is 50%;
- The relevant WWR graph to use is Figure 8a for a day use building; and
- The example's P/H ratio is 0.75, very close to P/H=0.8.

In Climate Zone 5, sun exclusion is important for most of the year, however in the example (Table 2), the shading device is raised 0.6m above the window head. This means that the shading design is not as effective as if it were located lower or at window head height. The graphs (Figures 4 to 11) assume the shadow-casting edge of the external shading overhangs is at the same height as the window head. The shading design's effectiveness can therefore be assumed to lie somewhere in the middle of the results for P/H=0.4 and P/H=0.8 on the graph (Figure 8a).

Using the graph to determine the glazing thermal specification

As the glazing is oriented north, use the E, N aspect points on the graph. To support a 50% WWR on this orientation, the glazing will need to have a maximum U-value of around 3.0, as the dotted black lines for U-values of 3.5 and 2.5 support maximum WWRs of 40% and 66% respectively. This U-value is sufficiently low that a double-glazed solution with either a low-E glazing pane or thermally broken frames will be required. If this

is likely to add too much cost to the project, the designer should consider reducing the glazing area on the north facade before proceeding into a detailed design with this glazing/shading concept.

If the cost of the glazing and its framing can be accommodated within the project budget for this 50 per cent WWR, the maximum required SHGC of north aspect glazing is then assessed separately.

The graph lines relevant to this example are:

- the medium blue dashed line (SHGC=0.45, P/H=0.4); and
- the dark blue dashed line (SHGC=0.45, P/H=0.8).

This is because the design performance was judged (see assumptions above) as being somewhere between a 0.4 and 0.8 P/H ratio. The allowed maximum WWRs for these two graph points are 46% and 70% respectively. By using a maximum SHGC of around 0.45 and a maximum U-value of around 3.0, the 50% WWR design in the worked example will comply with NCC 2022 Section J4D6 DTS provisions (J1.5 in NCC 2019). This is not an onerous total system SHGC maximum value and will offer the designer a range of compliant glazing colours that can be specified.

Confirming compliance

Once detailed design is complete, the task of entering all the data into the facade calculator for glazing on all aspects and building levels should confirm compliance for building certification. Minor aspect-specific non-compliances may be allowed as the facade calculator automatically checks Method Two compliance (which trades off exceeded allowances on some aspects with unused allowances on other aspects where the design is well within compliance).

Summary and further recommendations

The glazing provisions for commercial buildings contained within NCC 2019 and 2022 Volume One generally require higher thermal performance from facade glazing than those in earlier versions of the NCC. The one exception is facade glazing that is deemed to be display glazing. With these new thermal performance requirements, designers will need easy-to-use glazing design information to inform their development of early facade concepts that are not overly glazed.

Graphs of a limited range of glazing and shading options have been presented to enable early decision making on building orientation, glazing size and performance, the location of facade glazing and the design of external shading devices. Particular attention should be paid to the development of facade designs for nighttime-use buildings (hotels/hostels, healthcare ward areas and aged care facilities) where allowable glazed areas are quite small in all climate zones except zones two and five.

Where possible, designers should strive to design for better facade energy performance than that resulting from adopting the DTS minimum requirements.

Glossary of Terms

The terms and their meanings listed below are mostly sourced and adopted from Australian Building Codes Board publications including the National Construction Code 2022.

AFRC – Australian Fenestration Rating Council is the Australian equivalent of the NFRC, whose purpose is to certify windows, doors and skylights for energy efficiency performance. The AFRC makes use of the intellectual property developed by the NFRC.

Air-conditioning – a service that actively cools or heats the air within a space, but does not include a service that directly:

- a. cools or heats cold or hot rooms; or
- b. maintains specialised conditions for equipment or processes, where this is the main purpose of the service.

Aspect – orientation of wall-glazing within 45 degrees of the primary true compass directions (true north, east, south and west).

Backstop – a minimum R-value provision stipulated for opaque (non-glazed) facade elements that cannot be ignored, regardless of whether the maximum average facade U-value is complied with.

Climate Zone – an area defined in NCC Volume One Glossary in a map in Figure 2 and Table 3 for specific locations, having energy efficiency provisions based on a range of similar climatic characteristics.

Conditioned Space – in NCC 2022 Volume One, a space within a building, including a ceiling or under-floor supply air plenum or return air plenum, where the environment is likely, by the intended use of the space, to have its temperature controlled by air-conditioning.

Deemed-to-Satisfy (DTS) provisions – the prescriptive provisions which must be met to comply with the NCC's performance requirements. DTS provisions represent a recipe-book-style solution where the required performance of each design element is described in detail.

Display glazing – glazing used to display retail goods in a shop or showroom directly adjacent to a walkway or footpath, but not including that used in a cafe or restaurant.

Envelope – the parts of a building's fabric that separate a conditioned space or habitable room from either the exterior of the building or a non-conditioned space (a rooftop plant room, lift machine room, a carpark or a warehouse).

Fabric – the basic building structural elements and components of a building including the roof, ceilings, walls, glazing and floors.

Glazing – a transparent or translucent element and its supporting frame located in the envelope and includes any window other than a roof light. This means windows, glazed doors or other transparent and translucent elements (such as glass bricks) including their frames, located in the building fabric.

NFRC – National Fenestration Rating Council is an independent not-for-profit organization in the USA whose purpose is to certify windows, doors and skylights for energy efficiency performance.

Opaque – a non-transparent building material ie one that does not allow light to pass through. This includes masonry, timber, stone, fibre cement lining board, etc. Typical transparent or translucent materials are glass or polycarbonate sheeting. The term is important to the application of the building fabric and glazing provisions.

Performance Solution – formerly known as an Alternative Solution, it is a design that has complied with the NCC's performance requirements by means other than by using the Deemed-to-Satisfy provisions.

R-value – the thermal resistance of a component calculated by dividing its thickness by its thermal conductivity.

Reference Building – a hypothetical building that is used to calculate the maximum allowable annual heating load and cooling load for the proposed building.

Roof light – a skylight, window or the like installed in a roof at an angle of between 0 and 70 degrees to the horizontal plane, to permit natural light to enter the room below.

Solar admittance – the fraction of incident irradiance on a wall-glazing construction that adds heat to a building's space.

Spandrel panel – the opaque part of a facade in curtain wall construction which is commonly adjacent to, and integrated with, glazing.

Total R-value – the sum of the R-values of the individual component layers in a composite element including any building material, insulating material, airspace, thermal bridging and associated surface resistances.

Total System Solar Heat Gain Coefficient (SHGC) – the fraction of incident irradiance on a wall-glazing construction (including the adjacent framing) or a roof light that adds heat to a building's space.

Total System U-value – the thermal transmittance of the composite element allowing for the effect of any airspaces, thermal bridging and associated surface resistances.

Wall-glazing construction – the combination of wall and glazing components (at an angle of between 70 and 90 degrees to the horizontal plane) comprising the envelope of the building, excluding:

- a. display glazing; and
- b. opaque non-glazed openings such as doors, vents, penetrations and shutters.

Ward area – a patient-care area for resident patients and may contain areas for accommodation, sleeping, associated living and nursing facilities.

References and further reading

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About the Author

Michael Shaw

Educated in both engineering and architecture, Michael Shaw is an independent ESD engineering consultant. He has worked in government and in private consulting and has extensive experience in the application of environmental rating systems. He has delivered many training seminars for architects, engineers and building surveyors in the application of NCC Section J.



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