



# THE WINDOW CHECKLIST

EACH WEEK, THE AUSTRALIAN WINDOW ASSOCIATION RECEIVES QUERIES FROM BUILDERS, CONSUMERS, CERTIFIERS, THERMAL PERFORMANCE ASSESSORS, ARCHITECTS AND DESIGNERS ABOUT A WHOLE RANGE OF THINGS THAT ARE NOT CLEARLY UNDERSTOOD ABOUT WINDOWS. FOLLOWING ARE SOME TIPS ON HOW YOU CAN MEET THE NECESSARY REQUIREMENTS.

**W**hen I started in the industry around 28 years ago, things were very simple; there were no real performance requirements for windows and doors. Provided they opened, closed and had 3mm float glass in them, everything was fine. In fact I even remember people not being too worried about a bit of water coming through them into the home.

Things have changed now when it comes to windows and doors – they have to meet multiple performance requirements. This has added complexity to what was once a simple choice.

Through the continued evolution of standards and regulations, improvement to construction methods and greater consumer expectations, windows are a totally different beast from those I first encountered when starting in the industry.

Today's high performance windows have to meet not only the client's aesthetic needs, but be able to:

- withstand wind and rain;
- be energy efficient;
- offer sound attenuation;
- survive bushfires;
- provide safety and security;
- comply with the Building Code of Australia (BCA) and relevant standards; and
- adapt to emerging sustainability trends.

This checklist makes sure window and door products meet today's requirements when specifying, selecting, purchasing, certifying and installing.

It is important to have an understanding of what these items mean and how to ensure windows meet all the requirements.



Windows and doors must now meet multiple performance requirements, adding complexity to what was once a simple choice.

## 1. Correct wind loads for the site and construction type

*Wind loads:* Every site for every building in Australia should be assessed for wind load requirements according to AS/NZS 1170.2 *Wind loads for buildings* or AS 4055 *Wind loads for housing*. The wind loads are a deciding factor for the type of window and door system that will be used as they need to structurally withstand the loads that are present on the site. The two loads are serviceability limit state (SLS) and ultimate limit state (ULS). They are given in AS 2047 or calculated from AS/NZS 1170.2 or, if the construction is housing, AS 4055 can be used to obtain the N or C ratings. These site ratings should be calculated and supplied by the site engineer for the project or architect/designer/buildler.

*Construction type:* The requirements for windows change as the construction type changes. Have you ever considered why windows in commercial buildings have such big sections? This is because windows in commercial buildings are not allowed to deflect as much as windows in a house.

There are three different construction types used for windows.

**a. Housing** has a deflection limit of  $\ell/150$  where  $\ell$  is the height. This means if you have a window with a mullion or meeting stiles 1500mm high the equation would be  $1500/150 = 10\text{mm}$  or 1mm of movement for every 150mm. So, in this case, 10mm is the maximum deflection the mullion is allowed. The pressure that causes the mullion to deflect to 10mm is the maximum serviceability (SLS) wind pressure of the window.

**b. Residential** has a deflection limit of  $\ell/180$ . This means if you have a window with a mullion or meeting stile 1500mm high the calculation would be  $1500/180 = 8.3\text{mm}$  or 0.83mm of movement for every 150mm. So 8.3mm is the maximum deflection this mullion is allowed. The maximum serviceability [SLS] wind pressure for the window is the pressure required to deflect the mullion by 8.3mm.

**c. Commercial** has a deflection limit of  $\ell/250$ . This means if you have a window with a mullion 1500mm high the calculation would be  $1500/250 = 6\text{mm}$  or 0.6mm of movement for every 150mm. As 6mm is the maximum deflection the mullion is allowed, when the mullion deflects at 6mm the pressure is the maximum serviceability [SLS] wind pressure for the window.

The Australian Window Association website has a key message 'Building Classifications' that explains the different types of constructions and window requirements in more detail.

## 2. Selected windows meet the site requirements

Now that the site requirements have been determined we must make sure the windows being selected meet these requirements. Windows need to be tested for a number of conditions that will impact on their performance and durability.

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

- Structural – measures deflection of the window [SLS].
- Operating force – confirms opening force is within the set limits.
- Air infiltration – measures air leakage through the window or door.
- Water penetration – measures water penetration resistance.
- Ultimate strength – confirms the window meets ULS requirements.

Windows are tested for combinations of wind loads [SLS



and ULS) and Water Penetration Resistance [WPR] for all three 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.

## 3. Thermal comfort requirements

The BCA has technical provisions that relate to energy efficiency for all classes of buildings and there may also be state variations to these requirements. The energy efficiency provisions have a significant impact on the window selection. Compliance is achieved by the prescriptive measures found in the BCA, or through

performance-based solutions using simulation tools such as AccuRate, FirstRate, BERS Pro and BASIX.

A report or requirement from either of these compliance solutions will specify both the window performance for total window U Value [ $U_w$ ] and total window Solar Heat Gain Co-efficient [SHGC<sub>w</sub>].

## 4. Selected windows meet energy values

This is a key step to ensure that the products you are installing meet the BCA requirements. Energy efficiency provisions state that external glazing performance [total window system performance] data must be determined in accordance with the guidelines of the Australian Fenestration Rating Council [AFRC]. The Window Energy Rating Scheme [WERS] follows the guidelines of the AFRC which means that WERS ratings are compliant to the BCA.

Performance requirements from energy efficiency reports are given to the window supplier, who will match or exceed the requirements with their WERS-rated products. In some cases it will be easier to select the windows first then supply the performance data to whoever is rating the building.

**Warning:** Ensure window ratings have been done in accordance with the guidelines of the AFRC; if it hasn't been done to those protocols then it does not comply. Visit [www.wers.net](http://www.wers.net).

## 5. Bushfire attack level [BAL] assigned

Many construction sites now fall within bushfire-prone areas. This will have a significant impact on the types of windows and glass that must be used. AS 3959 *Construction of buildings in bushfire-prone areas* is the Standard that specifies the requirements to assess the site, then specifies building requirements. It is important to give the BAL rating to the window supplier so they can ensure they are providing you with a compliant product. ➤

## 6. Selected materials meet all requirements

There is a need to comply with all of the known material standards and regulations when designing, manufacturing and selecting windows and doors.

Once all of the window specific requirements have been determined, including the finishes and hardware, your window fabricator will be able to provide options.

The more information that is provided, the more fit for purpose [and cost-effective] the product will be.

## 7. BCA provisions met for windows

Make sure you can tick off that your windows and doors meet all of these BCA provisions.

- a. *Section 3.6* and *Section B*: Products are structurally adequate to meet site requirements for SLS and ULS [window manufacturers must be able to verify performance claims].
- b. *Section 3.6* and *Section F*: Products have a water penetration resistance that meets the site requirements [window manufacturers must be able to verify performance claims].
- c. *Section 3.3.4.9* and *Section F*: Flashing required to window and door systems to prevent water penetration around the system.
- d. *Section 3.6.4.6*: Manifestation required to glass doors and panels that could be mistaken for a door or unimpeded path of travel.

“

**THERE IS A NECESSITY TO COMPLY WITH ALL OF THE STANDARDS... WHEN DESIGNING, MANUFACTURING AND SELECTING WINDOWS AND DOORS.**

”

- e. *Section 3.7.4.7* and *Section G*: Bushfire requirements.
- f. *Section 3.9.2.2* and *Section D*: Balustrades and barriers; this could mean restricted opening etc.
- g. *Section 3.12.2* and *Section J*: Energy efficiency requirements.
- h. *Section 3.12.3.3* and *Section J*: Sealing in requirements for window and door systems to stop air leakage around the systems which significantly reduces energy efficiency.

## 8. Verification/validation documents on file

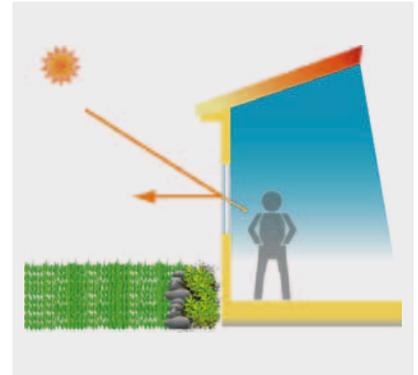
A range of items should be supplied by window companies to verify performance claims and enable validation of compliance to standards and regulations. These items should be requested and kept on file. They include:

- Performance labels attached to windows [a requirement in housing and optional in residential and commercial buildings].
- Compliance certificates. These should only be deemed acceptable if the company providing the certificate is a part of some type of accreditation scheme, such as the AWA independent third-party NATA accreditation scheme.
- Test reports should be requested if there is any doubt about the validity of labels or certificates supplied.
- Website listings can be a useful source of information to confirm if the company is a member of an industry association that implements an accreditation scheme.

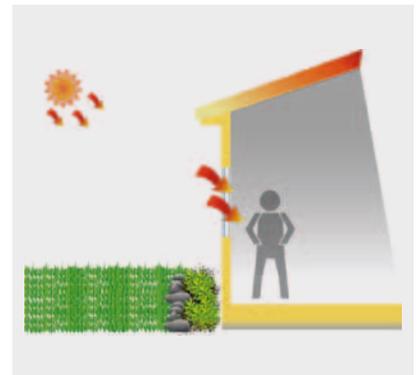
## 9. Installation requirements noted

Problems such as no flashings, smothered or missing weep holes, or loss of continuity in the water barrier are prime causes of leaks in window assemblies.

Severity of exposure to wind is the most important factor in specification and installation. Practices for



$U_w$  Value is the measure of heat transfer due to different temperatures inside and out.



Solar Heat Gain Co-efficient [ $SHGC_w$ ] is a measure of solar radiation entering through the window system.

sheltered situations may quickly fail when exposed to the full force of the wind and rain.

- Top hung products such as bifold doors require structural assessment to minimise deflection.
- Packing is crucial to avoid distortion through settlement.
- Adequate fixings should be used.
- Follow the window manufacturer's installation specification for the appropriate Terrain Category and height of the building. ■

*Given the complex nature of building components, it is impossible for building professionals to be fully across all of them. There are AWA guides to fixing and installation available at [www.awa.org.au](http://www.awa.org.au).*