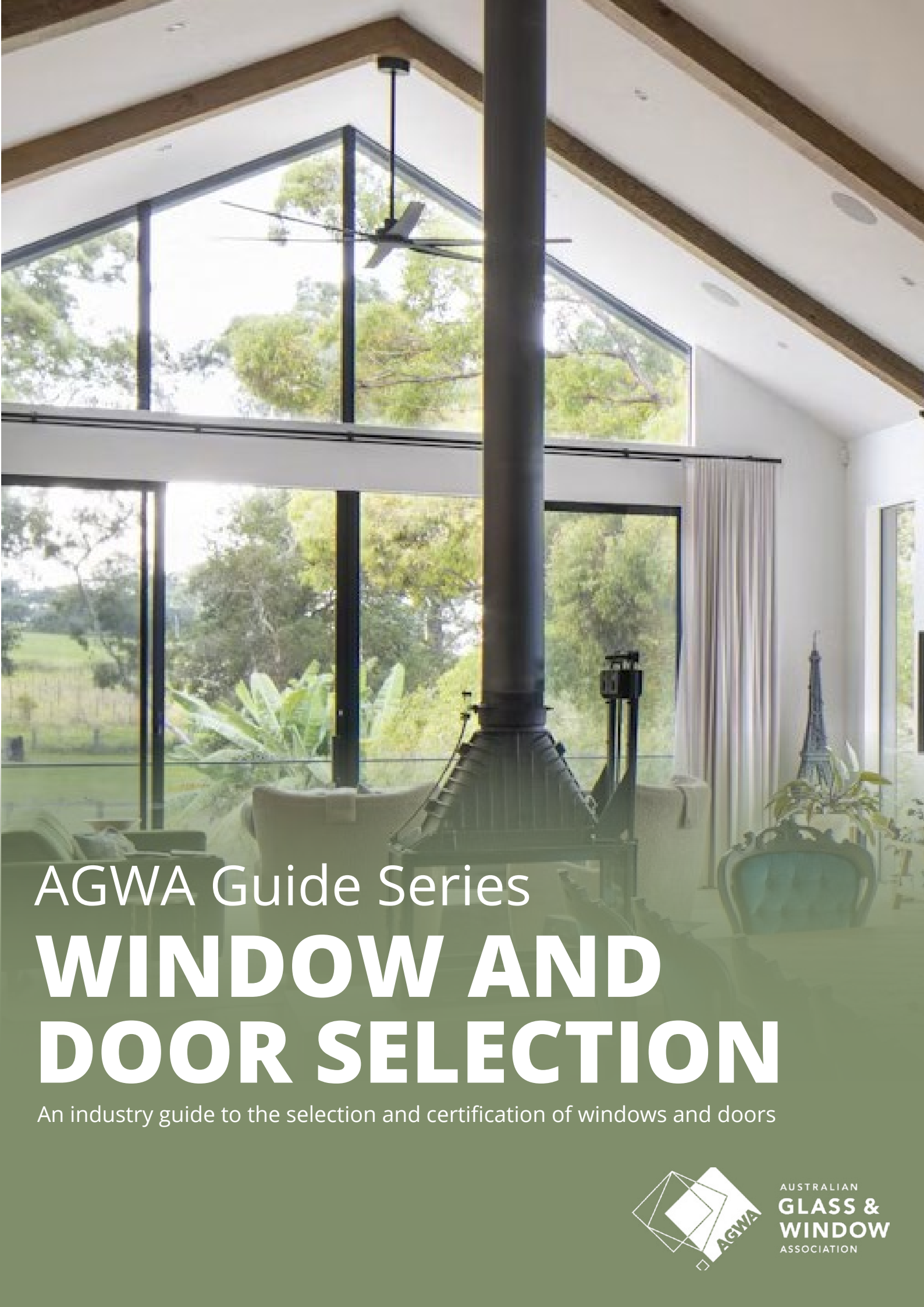




AGWA Guide Series **WINDOW AND DOOR SELECTION**

An industry guide to the selection and certification of windows and doors



AUSTRALIAN
**GLASS &
WINDOW**
ASSOCIATION

BACKGROUND

Foreword

As part of its commitment to raising the built performance standard of windows and doors in Australia, the Australian Glass and Window Association (AGWA) is pleased to provide this Industry Guide to the selection of windows and doors.

Australian Glass and Window Association

AGWA is made up of over 1000 glass processors, glaziers, window manufacturers and industry suppliers throughout Australia and overseas. Members of the Association have products tested to AS 2047 and glazed products in accordance with AS 1288. When purchasing from an AGWA member, buyers can be confident that the products are made to withstand Australian conditions. Non-compliant products may not be suited to Australian conditions.

The aims of AGWA are:

- To promote and advance the awareness of glass and windows as a major architectural component in building design.
- To establish and self-regulate minimum benchmark standards throughout Australia.
- To facilitate the education and marketing of these standards throughout the industry and wider community.
- To provide a national voice when representing the industry in discussion and negotiations with government, local authorities, business and trade associations and organisations, and the private sector.
- To promote and encourage ethical conduct and sound business practice in the industry.

The Window Energy Rating Scheme (WERS) is owned and operated by AGWA and provides a scientifically based, fair and credible rating system for the assessment of fenestration products for their energy efficiency performance. WERS is accredited by the Australian Fenestration Rating Council (AFRC) and adheres to AFRC protocols and procedures for the rating of windows and glazed doors. Energy Ratings provided by WERS are third party certified to the AFRC requirements, compliant with the National Construction Code (NCC), and able to be used to meet regulatory requirements.



CONTENTS

Industry Guide Objective

This Industry Guide outlines the basic information that needs to be considered and gathered for the selection of suitable, compliant and fit for purpose window and door products for a particular project. This guide can be used as a checking mechanism for certifiers to ensure window and door compliance with the National Construction Code (NCC).

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Disclaimer

While AGWA has made every effort to ensure that the material within this guide is accurate, AGWA will not be liable for any mistakes, errors or omissions arising as a result of information contained in this guide.

RESPONSIBILITIES

THE NATIONAL CONSTRUCTION CODE

The National Construction Code (NCC) is produced and maintained by the Australian Building Codes Board (ABCB) on behalf of the Australian Government and each State and Territory Government.

Under the NCC, the Building Code of Australia (BCA) is a uniform set of technical provisions for the design and construction of buildings and other structures throughout Australia. It allows for variations in climate and geological or geographic conditions.

Under Section H of Volume 2 of the BCA, performance requirements H1P1 and H2P2 are satisfied if windows are designed and constructed in accordance with AS 2047. For glazed assemblies not covered by AS 2047 compliance to AS 1288 is required.

Under Section B and Section F of Volume 1 of the BCA, performance requirements B1P1 and F3P1 are satisfied if windows are designed and constructed in accordance with AS 2047. For glazed assemblies not covered by AS 2047, compliance to AS1288 is required.

AS 2047 Windows and External Glazed Doors in Buildings

AS 1288 Glass in Buildings: Selection and Installation

NOMINATION OF SITE RATINGS

Extract from Appendix C AS 2047: 2014

Nomination of window ratings or design wind pressures for each window and door assembly should be as follows:

- (a). For housing, the purchaser should nominate —
 - (i). the window rating;
 - (ii). the window exposure classification; and
 - (iii). whether the window is a corner window when ordering the window assemblies.
- (b). For other residential buildings, the purchaser should nominate the design wind pressures when ordering the window assemblies.
- (c). For commercial buildings, the purchaser should nominate the design wind pressures for the window assemblies when ordering the windows.
- (d). The manufacturer of the window assemblies should verify the window assemblies meet the window rating or design wind pressures as provided by the purchaser.

IDENTIFYING COMPLIANCE

Extract from AS 2047:2014 – Section 8

8.1 GENERAL

Window assemblies for housing shall be labelled in accordance with Clause 8.2. Timber windows for housing and window assemblies for other than housing shall be labelled in accordance with Clause 8.2, or a certificate in accordance with Clause 8.3 shall be provided.

Note: Where windows for housing are supplied as incomplete assemblies, a certificate and a label giving manufacturer's identification marks, window rating and water penetration resistance should be provided with the window.

8.2 LABELLING

The label shall be so positioned that the window can be identified when viewed in situ.

Each window shall have the following information marked anywhere on the window assembly, except on the glazing (the application of rating labels on fixed glazed timber windows is permitted):

- (a) The manufacturer's identification mark.
- (b) The Serviceability Limit State wind pressure.
- (c) The Ultimate Limit State wind pressure.
- (d) The water penetration resistance.

8.3 CERTIFICATE

A certificate indicating the manufacturer's identification, the Serviceability Limit State wind pressure, the Ultimate Limit State wind pressure and the water penetration resistance shall be provided with window assemblies.

When making a statement of compliance with this Australian Standard on a product, packaging or promotional material related to that product, it shall be ensured that such compliance is capable of being verified.

When making a statement of compliance with this Australian Standard on a variation to a tested sample, it shall be ensured that such compliance is capable of being verified.

SELECTION

WIND LOADS

Every site for every building in Australia should be assessed for wind load requirements according to AS/NZS 1170.2 Wind Actions or AS 4055 Wind Loads for Housing (a simplified document 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 the architect, designer or builder.

QUICK CHECK

For Housing
What is the N or C Rating for the site?

Other Construction
What are the Serviceability Limit State (SLS) and Ultimate Limit State (ULS) loads for the site?

Window Rating	Serviceability Pressure, Pa	
	General	Corner Windows
N1, N2	400	600
N3, C1	600	800
N4, C2	800	1200
N5, C3	1200	1800
N6, C4	1600	2500

Table 2.1: Serviceability Strength Test Pressures

Window Rating	Ultimate Limit State Pressure, Pa	
	General	Corner Windows
N1	600	900
N2	900	1300
N3	1400	2000
N4	2000	3000
N5	3000	4500
N6	4000	6000
C1	1800	2700
C2	2700	4000
C3	4000	5900
C4	5300	8000

Table 2.2: Ultimate Strength Test Pressures

Note: The pressures are as per AS 4055, rounded to the nearest 100 Pa.

SITE CONDITIONS

Now that the site requirements have been determined we must ensure 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 in AS 2047. The tests completed are:

- 1. Structural:** Measures deflection of the window (SLS) @ Span/250.
- 2. Operating Force:** Confirms opening force is within the set limits.
- 3. Air Infiltration:** Measures air leakage through the window or door.
- 4. Water Penetration:** Measures water penetration resistance (WPR).
- 5. Ultimate Strength:** Confirms the window meets ULS requirements.

Windows are tested for combinations of wind loads (SLS and ULS) and WPR for all 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.

Window Rating	Non-exposed, Pa	Exposed, Pa
N1, N2	150	200
N3, C1	150	300
N4, C2	200	300
N5, C3	300	450
N6, C4	450	600

Table 2.3: Water Penetration Resistance Test Pressures

QUICK CHECK

For Housing
Do the windows meet the requirements for the N or C Rating given for the site?

Other Construction
Do the windows meet the requirements for the Serviceability Limit State (SLS) and Ultimate Limit State (ULS) loads given for the site?

Is the Water Penetration Resistance $\geq$ 30% of the +Positive SLS load given for the site?

SELECTION

THERMAL COMFORT

The NCC has 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 window selection.

Compliance is achieved by the prescriptive measures found in the NCC, or through performance based solutions using simulation tools such as AccuRate, FirstRate, Hero, BERSPro and BASIX.

A report or requirement from any 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 ($SHGC_w$).

U Value (U_w) measures how readily a window conducts heat. It is a measure of the rate of non-solar heat loss or gain through the assembly.

The lower the U Value, the greater a window's resistance to heat flow and the better its insulating value.

Solar Heat Gain Coefficient ($SHGC_w$) measures how readily heat caused by sunlight flows through a window.

$SHGC_w$ is expressed as a decimal between 0 and 1. The lower a window's $SHGC_w$, the less solar heat it transmits.

The Window Energy Rating Scheme (WERS) is accredited by the AFRC - which means that WERS ratings are compliant with the NCC. 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.



Figure 2.2 Solar Heat Gain Coefficient ($SHGC_w$)

WARNING: Ensure window ratings have been done in accordance with the protocols of the AFRC. If it hasn't been done to those protocols then it **does not comply**. Visit www.wers.net for more information.

QUICK CHECK

What are the total window U Value (U_w) and total window Solar Heat Gain Co-efficient ($SHGC_w$) requirements as specified by the chosen compliance solution?

QUICK CHECK

Do the total window U Value and Solar Heat Gain Co-efficient meet or exceed the requirements as specified?

Substitution of alternative windows during construction is acceptable provided that:

For Housing

1. The U value of the actual window must be equal to or less than the U value of the rated window; and
2. The Solar Heat Gain Coefficient of the actual window must be within 10% of the rated window.
* * The variation in $SHGC_w$ is subject to confirmation within the NatHERS rating tools. The rating must still exceed minimum compliance at the +10% or -10% level.

BASIX provides compliance requirements on each certificate.

Other Construction

The WERS rating for U Value (U_w) must be equal to or less than the energy report requirements. The WERS rating for Solar Heat Gain Co-efficient ($SHGC_w$) must be within -10% of the energy report requirements.



Figure 2.1: U Value (U_w)

ENERGY VALUES

This is a key step to ensure that the products you are installing meet the NCC 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).

SELECTION

BUSHFIRE ATTACK LEVEL

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 specifies the requirements to assess the site and building requirements. It is important to give the correct Bushfire Attack Level (BAL) to the window supplier so they can ensure they are providing you with a compliant product. Compliance can be checked through systems either meeting the prescriptive provisions of AS 3959 or via test reports if systems have been tested to meet bushfire requirements.

AGWA have a useful guide for windows and doors in bushfire prone areas, visit www.agwa.com.au to download.

QUICK CHECK

Does the site have a BAL rating that needs to be met?

Do the windows and doors meet the requirements of the BAL rating? The window manufacturer will have proof of compliance through prescriptive provisions or test reports showing performance levels met.

MATERIALS

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, including the finishes and hardware have been determined, your window fabricator will be able to provide options.

Considerations should be made for the following conditions:

- Harsh corrosive environments, coastal or industrial.
- Acoustic performance requirements.
- Safety and security.
- UV resistance: Australia has a significantly higher level of UV than many other countries. Materials such as uPVC require higher levels of UV performance.

The more information that is provided the more fit for purpose (and cost effective) the product will be.

QUICK CHECK

Have you considered all of the requirements of the materials you are specifying?

VERIFICATION

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 retained.

They include:

- Performance labels attached to windows. This is a requirement in housing. Figure 2.3 illustrates an example of performance labels that conform to AS 2047: 2014.
- 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. Figure 2.4 illustrates an example of a compliance certificate that conforms to AS 2047: 2014.
- Test reports should be requested if there is any doubt about the validity of labels or certificates supplied. Refer to Figure 2.5.
- Website listings can be a useful source of information to confirm if the company is a member of an industry association that has an accreditation scheme and audit program.

QUICK CHECK

Are windows labelled with performance data that meets the site requirements?

If a compliance certificate has been issued, check if the company is a member of an association that has an independent third party accreditation scheme (AGWA member). If they are not, ask for a test report showing window and door performance.

View AGWA and WERS websites for company listings, www.agwa.com.au and www.wers.net



**AUSTRALIAN
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ASSOCIATION**

This manufacturer certifies that this product was designed to conform with AS2047. The design performance has been verified by a NATA accredited test laboratory. This manufacturer is a member of the AGWA Accreditation Program.

ABC

YOUR COMPANY LOGO

ACCRED MEMB No. 000

DESIGN PERFORMANCE		
N2 GEN SLS 0.4 kPa ULS 0.9 kPa	N2 CNR SLS 0.6 kPa ULS 1.3 kPa	
Water Resistance		
Non Exposed 150 Pa	Exposed 200 Pa	

Figure 2.3: Performance Label AS 2047: 2014



**2026 WINDOW COMPLIANCE
CERTIFICATE - HOUSING**

Housing is defined as a Class 1 or 10 building as defined by the National Construction Code (NCC) within the geometric limitations specified in AS 4055.

Accredited Company/Membership No.: _____

Client Name: _____

Site Address: _____

Delivered on: _____

The windows and doors have been manufactured to comply with the Australian Window Standard AS 2047:2014 and Glass Standard AS 1288:2006 – 2021 (including human impact requirements) and National Construction Code energy efficiency, bushfire and fall prevention requirements as specified by the purchaser.

Wind Loads N Ratings					
Window Rating (AS 4055)	Serviceability Limit State (SLS) Pa		Ultimate Limit State (ULS) Pa		Water Penetration Resistance State (WPR) Pa
	General	Corner	General	Corner	Non-Exposed / Exposed
N1	400	600	600	900	150 / 200
N2	400	600	900	1300	150 / 200
N3	600	800	1400	2000	150 / 200
N4	800	1200	2000	3000	200 / 300
N5	1200	1800	3000	4500	300 / 450
N6	1600	2500	4000	6000	450 / 600

Wind Loads C Ratings					
Window Rating (AS 4055)	Serviceability Limit State (SLS) Pa		Ultimate Limit State (ULS) Pa		Water Penetration Resistance State (WPR) Pa
	General	Corner	General	Corner	Non-Exposed / Exposed
C1	600	800	1800	2700	150 / 300
C2	800	1200	2700	4000	200 / 300
C3	1200	1800	4000	5900	300 / 450
C4	1600	2500	5300	8000	400 / 600

Corner Windows Item Numbers: _____

Fall Prevention: _____

Windows Restricted to max 125mm _____

Fall Prevention Screens _____

Not Required _____

By Others _____

Item Number: _____

Acoustics _____

Acoustic Rating (Rw) _____

Notes: _____

Energy Performance Ratings, AFRC Results:

U Value: U_g _____

Solar Heat Gain Coefficient, SHGC_g _____

Refer to attached schedule _____

Basix/NabERS Certificate Number: _____

Bushfire: _____

BAL LOW (Not Applicable) _____ Tested (AS 1530.8.1) _____

BAL 12.5 _____ Prescriptive (AS 3959) _____

BAL 19 _____

BAL 29 _____

BAL 40 _____

BAL F2 _____

Signed: _____ Date: _____

(Builder/Installer)

The builder/installer certifies that the windows and doors supplied have been installed correctly in accordance with the requirements of the National Construction Code and the human impact glass located in the correct openings.

Signed: _____ Date: _____

(Company supplying the Windows and Doors)

Figure 2.4: Compliance Certificate AS 2047: 2014



IAN BENNIE & ASSOCIATES PTY. LTD.
 Building Performance Testing

ACN : 007 133 253

TEST REPORT NUMBER 2015-XXX-S1



Test Client: XX Windows

Sample Identification: An XX Sliding Door Window , measuring 2360 mm in height x 2380 mm in width The sample is detailed in the XX Windows drawings given in Appendix C.

Test Method: Operating Force, Air Infiltration, Water Penetration Resistance and Ultimate Strength test performance requirements to Clause 2.3 of Australian Standard AS2047-2014, and test procedures to Australian Standard AS4420-1996 as detailed in Appendix A.

Test Location: IBA Test Centre Dandenong, Melbourne.

Test Date(s): 10 November 2014.

Pre-loading: The sample was operated five (5) times prior to the commencement of testing.

TEST RESULTS

Detailed test results are given in the body of the report. Summary results are given below.

Housing ratings:

Regions A & B General N4

..... Corner N3

Region C +980 # and -980 # Pa

Region D +770 # and -770 # Pa

Residential building ratings:

Region A +1000 ‡ and -1300 Pa

Region B +1000 ‡ and -1020 # Pa

Region C +980 # and -980 # Pa

Region D +770 # and -770 # Pa

Commercial building ratings:

Region A +970 and -1000 Pa

Region B +970 and -1000 Pa

Region C +970 and -980 # Pa

Region D +770 # and -770 # Pa

‡ - rating is limited by the maximum water test pressure applied without failure.

- rating is limited by the maximum ultimate test pressures applied without failure.

Air Infiltration: LOW rating

Maximum Water Penetration Resistance Pressure: 300 Pa

IBA Report: 2015-XXX-S1 - Page 1 of 7

1 Luisa Avenue, Dandenong 3175, Victoria , Australia

Telephone : (03) 9768 3640 International : +613 9768 3640 Facsimile: (03) 9768 3642

Figure 2.5: Test Report

INSTALLATION

INSTALLATION REQUIREMENTS

Four key steps to installation of windows and doors:

1. Square and plumb. This will ensure the functionality of the system.
2. Packing. Packing between the window and building frame ensures that the frame remains square and plumb and adds strength to the nail or screw fixing.
3. Fixing. The window or door needs to be fixed to enable the system to withstand the wind loads applicable to the site.
4. Flashing. Windows and doors should be flashed to stop water penetration around the outside of the system. This is the responsibility of the installer.

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.

Particular care must be taken when flashing windows for light weight construction. Consult the window manufacturer and the walling system supplier for details of how to correctly treat penetrations.

There is not one particular detail which is applicable to all lightweight wall cladding materials. However, there are some simple principles which, if followed, should provide a good performing installation that will stand the test of time.

1. A 'Z' shaped metal head flashing extending beyond the width of the window - minimum 25mm; ideal 50mm.
2. The window to be fitted with poly flashing to jambs and sill. Jamb flashing should extend 100mm above and below the window jamb height. The sill flashing to extend to the outside width of the jamb flashings.
3. All flashings must offer weathering overlap i.e. the sarking above the window must overlap the metal head flashing; the head flashing must overlap the window jamb poly flash. The jamb poly flash must overlap the sill poly flash and both jamb and sill poly flash must overlap the wall sarking.
4. There must be provision for drainage below the window and ideally along the bottom of the sheeting for the full length of the wall.

There are many different types of window designs which make it very difficult to create generic installation details to cover all window systems. In most cases, the walling system suppliers provide details for window installation. However, not all cladding manufacturers' details are suited to window weathering and drainage, nor are they aligned with window manufacturers' installation details.

A lot of these wall cladding materials are used in residential applications where traditional finned windows are used. With this window type, the waterproof line of the window is the fin and not the front face of the window.

Sealing or attempting to seal to the front face of the window is destined for failure.

QUICK CHECK

Have installation instructions been given to the installer by the window and door manufacturer?

Does the installer have a copy of AGWA generic installation and fixing guides?

Severity of exposure to wind is the most important factor in specification and installation. Practices for sheltered situations may fail quickly 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 building.

AGWA guides for fixing and installation are available at www.agwa.com.au

WARNING: Incorrect installation of windows and doors can cause significant damage to the building.

CHECKLIST

Ensure products meet current requirements when specifying, supplying, selecting, purchasing, certifying, and installing.



Wind Loads

- Confirm products are structurally adequate for Serviceability Limit State (SLS) and Ultimate Limit State (ULS) based on site wind classification.
- Verify compliance with AS 4055 or AS 1170.2 as appropriate.



Site Conditions

- Check water penetration resistance meets site exposure category (e.g., high wind/rain areas).
- Ensure compliance with AS 2047 for water penetration testing.



Safety

- Glass Manifestation: Ensure application of markings on glass doors/panels that could be mistaken for an open path.
- Fall Prevention:
 - Windows in bedrooms located >2 m above ground must be restricted or fitted with child-safety screens.
 - Confirm compliance with AS 5203 and NCC child fall prevention requirements.



Thermal Comfort & Energy Efficiency

- Ensure glazing and frame selections meet BASIX, NatHERS, or NCC energy efficiency provisions.
- Check U-value and Solar Heat Gain Coefficient (SHGC) align with certificate requirements.



Bushfire Compliance

- Confirm products meet site-specific Bushfire Attack Level (BAL) rating under AS 3959.
- Use certified bushfire-resistant materials where required.



Installation Requirements

- Install flashing and appropriate sealing around windows and doors to prevent water ingress.
- Follow manufacturer's installation instructions and NCC requirements for weatherproofing.

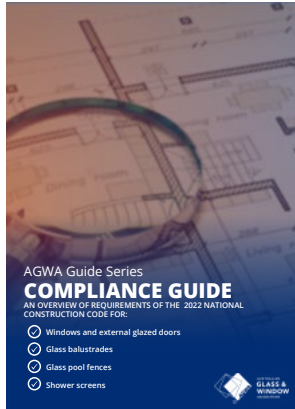
*Window manufacturers must be capable of verifying performance claims.

Additional Best Practices

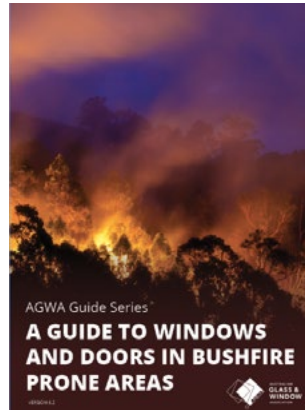
- **Documentation:** Keep certificates for compliance (structural, energy, bushfire).
- **Inspection:** Conduct on-site checks for correct installation and safety features.
- **Maintenance Guidance:** Provide end-users with care instructions for long-term performance.

AGWA Guide Series

Compliance



Windows and Doors in Bushfire Prone Area



Energy Efficiency



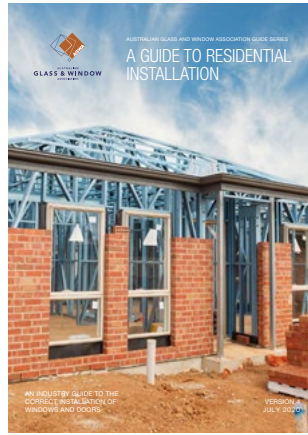
Access and Mobility



Window & Door Fixing



Residential Installation



Glass and Glazing



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