

Design Standards

RESPONSIBILITY

There are three prime areas of responsibility identified in the process of specifying, supplying and installing windows. To comply with the requirements the following procedure should be adhered to.

- Firstly, the designer must provide the builder with the wind classification or loading applicable to the building
- Secondly, the window manufacturer must be able to certify that the windows supplied will meet the specified performance.
- Thirdly, the builder must ensure that the windows as supplied are labelled or certified to the specific ratings and installed in accordance with the Australian Window Association Installation Manual

Note: The fabricator SHOULD NOT determine the wind pressure, as they are not qualified.

RECOMMENDATION

The tables and graphs in this manual are presented as a quick method of calculating the approximate structural performance of any given system with basic site conditions. For borderline or unusual cases, Ullrich Aluminium recommends that a qualified structural engineer check calculation. Any assistance, information or recommendation supplied by Ullrich Aluminium is given in good faith and believed to be appropriate for the application, however without any liability or responsibility on Ullrich Aluminium's part.

AUSTRALIAN STANDARDS

AS2047 Windows in buildings – Selection and installation

AS1170.2 Structural design actions Part 2: Wind actions

AS4055 Wind loads for housing

CALCULATING DESIGN WIND LOADS

Framing and window systems should be correctly selected to withstand the structural loads that will be applied to them. AS1170.2 sets out the method for calculating design wind loads. This is a complex procedure of calculations, so knowledge of the building location, height and wall construction will be required.

STEP 1. Building needs to be classified

Housing, Residential or Commercial. They all have different performance requirements therefore – select the classification from Table 1 below:

Table 1. Building Classification

Classification	Application	Description
Class 1a	Housing	Single, detached or attached residences separated by a fire resistant wall.
Class 1b	Housing	Boarding, guest house or hostel where: total floor area does not exceed 300m ² there are maximum 12 residents it is located above or below a private garage
Class 2	Residential	Building containing 2 or more separate residences
Class 3	Residential	Residential building other than Class 1 or 2, used for long term accommodation of unrelated persons; Boarding house, guest house, hostel Residential parts of hotels and motels Residential parts of schools, health care buildings, accommodation for the aged, disabled or children.
Class 4	Residential	A sole residence in Class 5, 6, 7, 8 or 9 building.
Class 5	Commercial	Office building excluding Class 6, 7, 8 or 9.
Class 6	Commercial	Shop or building used for the sale of goods or services to the general public.
Class 7	Commercial	Car park, storage or display of goods for wholesale.
Class 8	Commercial	Laboratory or building used for production, assembly, packaging, finishing or cleaning of goods for sale.
Class 9a	Commercial	Public assembly building including workshops, laboratories and classrooms, excluding other parts of a different Class. but
Class 10	Commercial	Non habitable building such as private garages of sheds.

Note: The table is provided as guide only. For further details please refer to the appropriate section of the Australian Building Code.

STEP 2. Building needs to be defined.

A house can be a Class 1 subject to its geometric size. AS4055 defines a building as follows:

Table 2. Housing Definitions

Reference	Maximum dimension
From ground to the underside of eaves	6 m
From ground to the highest point of roof excluding chimney	8.5 m
External wall height measured between storeys	2.7 m
Building width including roofed verandas, but excluding eaves	16 m
Building length	Not to exceed 5 x width
Roof pitch	Not greater than 35°

STEP 3. Determine window rating

The rating is the wind pressure that the window can withstand. AS1170.2 defines window ratings for residential buildings as "LIMIT STATE DESIGN WIND PRESSURE" AS2047 and AS4055 defines window rating for housing as "WIND CLASSIFICATION" The Building Window Rating is subject to 'Individual aspects which can change according to the 'building application; see Table 3 below:

TABLE: 3. Window Rating

Application	Deflection – all applications	Water penetration	Air infiltration L/s m ² at test pressure - all applications
Housing	Span/250	150pa - 600pa depending on window rating and exposure.	Low level <=5.0 at 75Pa High level <=1.0 at 75Pa
Residential		30% of Serviceability	
Commercial			

STEP 4. Who should specify rating and pressure?

AS2047 States that:

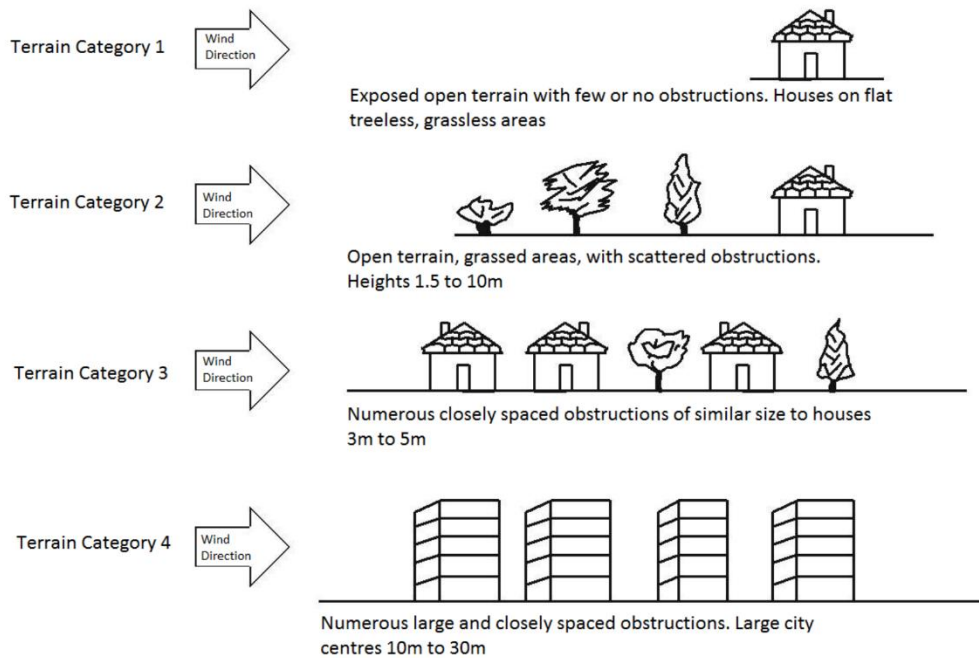
1. The Purchaser (building designer) should nominate the Design Wind Pressure and Window Rating.
2. The Manufacturer must stipulate that the selected product will meet the specified performance. In addition windows must be certified and labelled.
3. The Builder must ensure that the windows supplied are certified, labelled and fixed in accordance to manufacturer's recommendation
4. The Fabricator/Installer should not determine "Wind Pressures" or "Rating" unless they are qualified.

STEP 5. Selecting the wind rating.

1. First select the Region (see maps on pages 4-6) then select the Terrain Category (see page 7). This will range from 1 to 4 subject to obstructions that will influence the wind intensity on the building. The shielding will also affect the exposure. If structure is located on a hill or steep slope this also will make a difference to the wind intensity (see page 7).
2. Once the REGION, TERRAIN CATEGORY, BUILDING HEIGHT has been identified the "Wind Rating" can be selected for your particular region (see pages 4-6)

Terrain Category

Terrain category will range from 1 to 4 subject to obstructions that will influence the wind intensity on the building. See AS1170.2 clause 4.2.



Shielding Factor

The shielding factor will also affect the exposure of the building. See table 4.3 AS1170.2. Usually taken as 1.0.

Topographical Factor

The wind intensity will increase if the building is located on top of a hill, ridge or steep slope. The hill shape multiplier shall be taken as 1.0 except for specific areas. See AS1170.2 TABLE 4.4

Note: The above factors are simplified; anyone wishing to calculate the wind load/ratings is advised to refer to the Australian Standard AS1170.2

Chart 1 Window ratings for "Residential and Commercial"

Region A

Terrain category 2	3 storey	Serviceability = 1000Pa Ultimate = 1800Pa
	9 storey	Serviceability = 1300Pa Ultimate = 2300Pa
Terrain category 3	3 storey	Serviceability = 700Pa Ultimate = 1200Pa
	9 storey	Serviceability = 1000Pa Ultimate = 1800Pa
Terrain category 4	3 storey	Serviceability = 600Pa Ultimate = 1000Pa
	9 storey	Serviceability = 700Pa Ultimate = 1200Pa

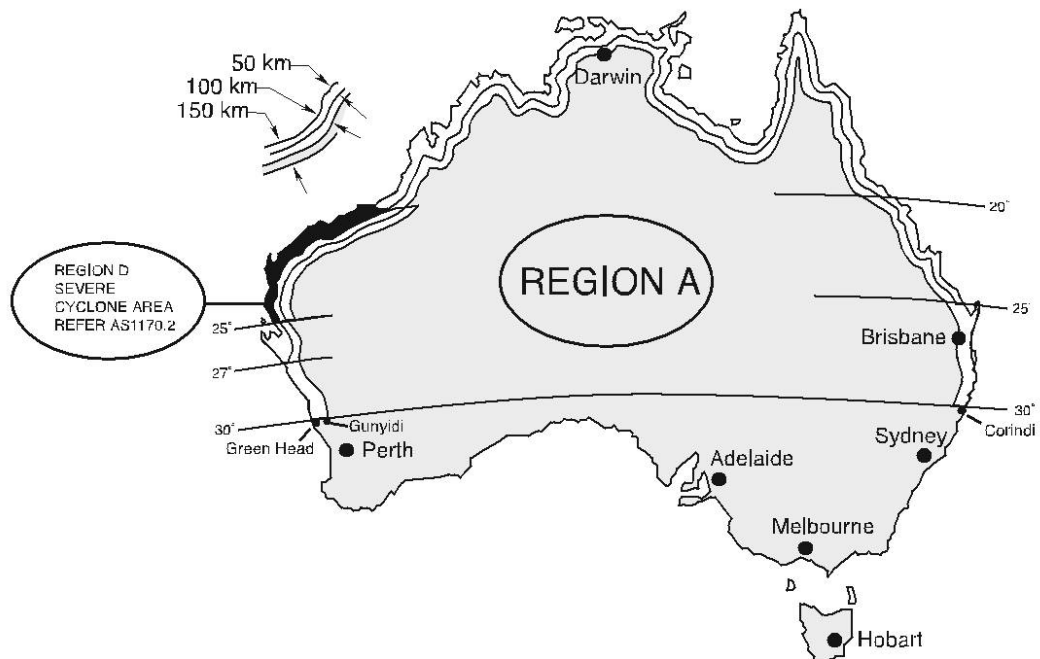


Chart 2

Window ratings for "Residential and Commercial" Region B

Terrain category 2	3 storey	Serviceability = 1000Pa Ultimate = 2600Pa
	9 storey	Serviceability = 1300Pa Ultimate = 3300Pa
Terrain category 3	3 storey	Serviceability = 700Pa Ultimate = 1800Pa
	9 storey	Serviceability = 1000Pa Ultimate = 2600Pa
Terrain category 4	3 storey	Serviceability = 600Pa Ultimate = 1500Pa
	9 storey	Serviceability = 700Pa Ultimate = 1700Pa

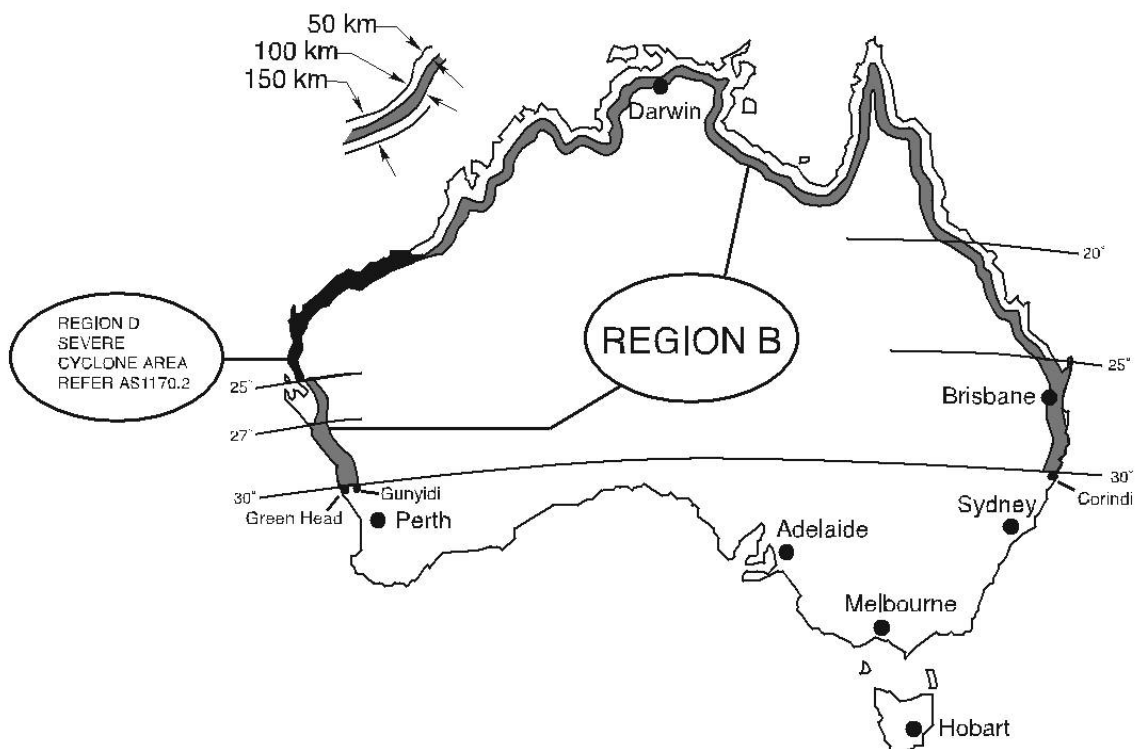


Chart 3

Window ratings for "Residential and Commercial" Region C

Terrain category 2	3 storey	Serviceability = 2100Pa Ultimate = 5000Pa
	9 storey	Serviceability = 2600Pa Ultimate = 7200Pa
Terrain category 3	3 storey	Serviceability = 1400Pa Ultimate = 4000Pa
	9 storey	Serviceability = 2100Pa Ultimate = 6700Pa
Terrain category 4	3 storey	Serviceability = 1200Pa Ultimate = 4000Pa
	9 storey	Serviceability = 1300Pa Ultimate = 6700Pa

