PAB10

LYSAGHT PRODUCT ADVISORY BULLETIN

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WIND CLASSIFICATION DESIGN GUIDE

To determine the wind classification for your domestic building site you must consider 4 factors: the Region, the Terrain Category, a Shielding Factor and the Topography. This information is to be used as an approximate guide for residential structures only. This information is based on the Australian Standard AS 4055, wind load for housing. For a detailed analysis refer to the Australian Standard AS/NZS 1170.2.
This approach is only suitable for houses up to 2 storeys high and no wider than 16m and 8.5m high.

To determine the Wind Speed acting on the proposed structure there are six steps:

Step 1:
Select your region

Step 2:
Select your Terrain Category

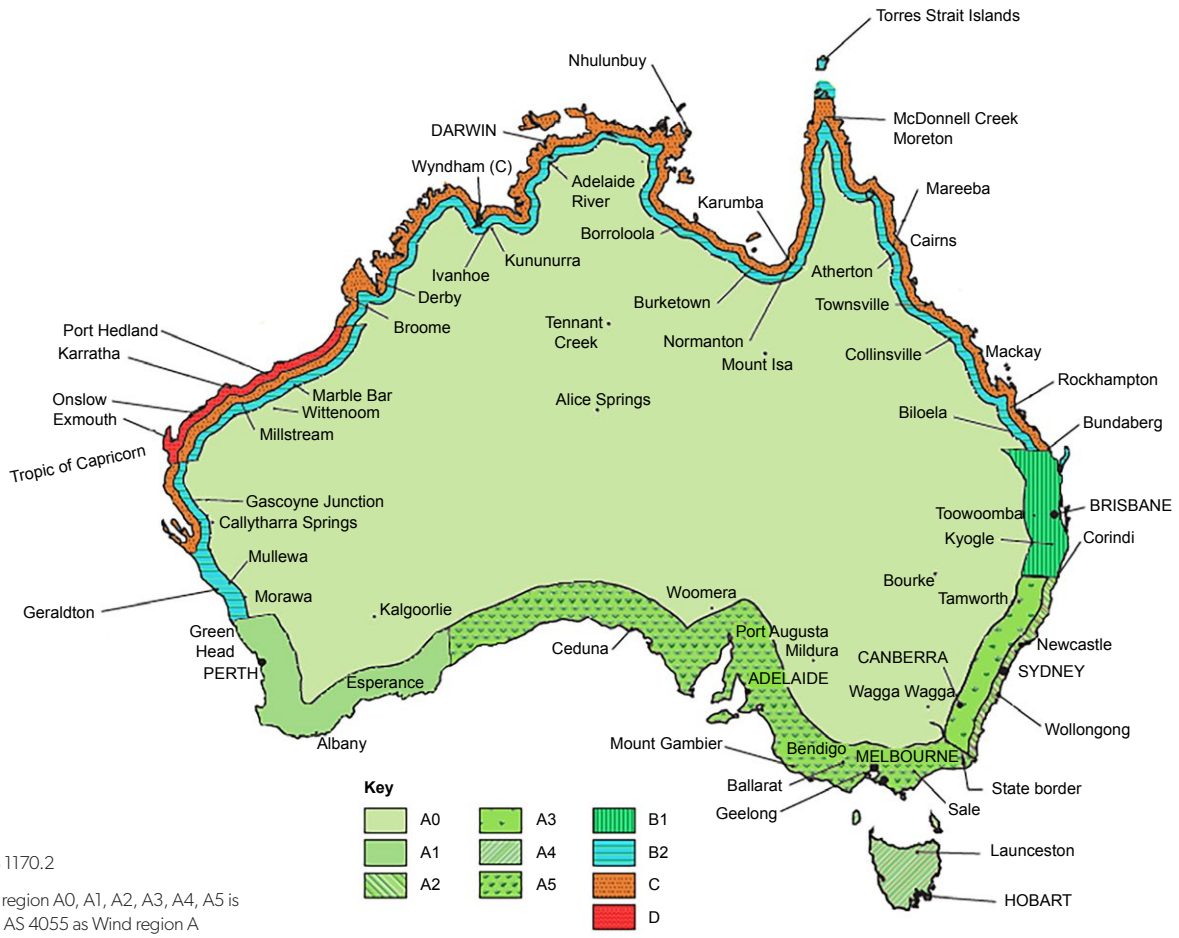
Step 3:
Select your Shielding Class

Step 4:
Select your Topographic Classification

Step 5:
Determine the Wind Classification

STEP 1. WIND REGION

Choose your wind region based on the dwelling location.



Ref: AS/NZS 1170.2

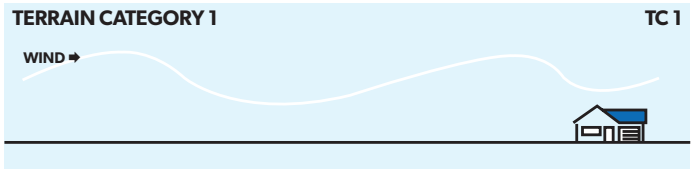
Note: Wind region A0, A1, A2, A3, A4, A5 is combined in AS 4055 as Wind region A

STEP 2. TERRAIN CATEGORY

Determine your terrain category. The terrain category describes the surface roughness of the surrounding area within a distance of 500m from the housing site.

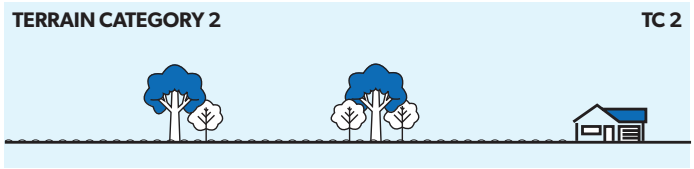
CATEGORY 1 – TC1

Very exposed open terrain with very few or no obstructions, and all water surfaces, e.g. flat, treeless, poorly grassed plains; open ocean, rivers, canals, bays and lakes.



CATEGORY 2 – TC2

Open terrain including grassland with well-scattered obstructions having heights generally from 1.5 m to 5 m with no more than two obstructions per hectare, e.g. farmland and cleared subdivisions with isolated trees or clumps of trees, equivalent to at least house size, and uncut grass.



CATEGORY 2.5 – TC2.5

Terrain with a few trees or isolated obstructions. This category is intermediate between TC2 and TC3 and represents the terrain in developing outer urban areas with scattered houses or clumps of trees equivalent to house size, or large acreage developments with fewer than 10 house-size obstructions per hectare.



CATEGORY 3 – TC3

Terrain with numerous closely spaced obstructions having heights generally from 3 m to 10 m. The minimum density of obstructions shall be at least the equivalent of 10 house-size obstructions per hectare, e.g. suburban housing, light industrial estates or clumps of trees greater than house size.



STEP 3. SHIELDING CLASS

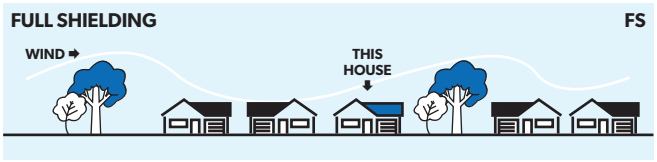
Determine Shielding class. The shielding class is a measure of the effect of surrounding buildings, or similar obstructions, on the wind speed at the site.

FULL SHIELDING – FS

Full shielding shall apply where there are no open areas within 100 m of the site and at least two rows of houses or similar-sized permanent obstructions surround the house being considered. In Regions A and B_1, permanent, closely spaced trees with a height greater than the proposed house and extending equivalent to three rows of houses, shall be determined to provide full shielding. Full shielding shall be only for houses within Topographic Classes T0, T1 and T2.

The application of full shielding shall be appropriate for typical suburban development greater than or equal to 10 houses, or similar size obstructions per hectare.

Note: The effects of road reserves or other small open areas with a width of less than 20 m adjacent to the house site may be ignored.



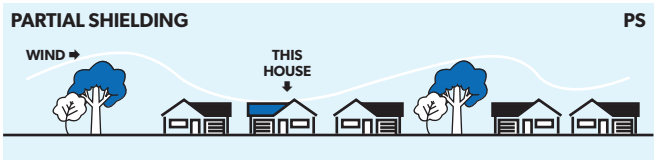
PARTIAL SHIELDING – PS

Partial shielding shall apply to intermediate situations where there are at least 2.5 houses or sheds per hectare, such as acreage type suburban development.

Partial shielding shall be only for houses within Topographic Classes T0, T1, T2 and T3.

Note: The second row of houses abutting open parkland, open water or airfields may be classified as having partial shielding.

In Regions A and B_1, permanent, closely spaced trees with a height greater than the proposed house and extending equivalent to two rows of houses provide partial shielding.



NO SHIELDING – NS

No shielding shall apply where there are no permanent obstructions or where there are less than 2.5 obstructions per hectare, such as the row of houses or single houses abutting open parklands, open water or airfields.



STEP 4. TOPOGRAPHY EFFECT

The Topographic class is a measure of the effect of wind on a house on rising ground.

The bottom of the hill is considered very flat or if the slope is less than a 1 in 20 rise a minimal slope would be classed as T0. The maximum slope is measured at the steepest part of the hill regardless of where the dwelling is positioned. A cliff is a slope of greater than 1 in 3 and has the maximum of T5 at the top. Over the top of the hill the wind pressures drop down.

	Location On Hill (Zone)				
Maximum Slopes	**Lower Third**	**Mid Third**	**Top Third**		
			H<10m	**10m<H<30m**	**H >30m**
< 1:20 **Very Flat**	T0	T0	T0	T0	T0
≥ 1:20 to < 1:10 **Flat**	T0	T0	T1	T1	T1
≥ 1:10 to < 1:7.5 **Small Hill**	T0	T1	T1	T2	T2
≥ 1:7.5 to < 1:5 **Medium Hill**	T0	T1	T2	T2	T3
≥ 1:5 to < 1:3 **Big Hill**	T0	T2	T2	T3	T4
≥ 1:3 **Cliff**	T0	T2	T3	T4	T5

H = height of the hill, ridge or escarpment (m)

STEP 5. WIND CLASSIFICATION

WIND CLASSIFICATION SYSTEM FROM AS 4055 WIND LOAD FOR HOUSING

AS 4055 sets out 10 wind classes N1~N6 and C1~C4.
The classification is a combination of wind region, terrain category, shielding and topography. By determining the appropriate wind class, the user can use AS 4055 and other design aids to design dwelling or parts of dwelling for wind load accordingly.

Wind region	Terrain Category	Topographic Classification												
		T0			T1			T2			T3		T4	T5
		FS	PS	NS	FS	PS	NS	FS	PS	NS	PS	NS	NS	NS
A	3	N1	N1	N1	N1	N2	N2	N2	N2	N2	N3	N3	N3	N4
	2.5	N1	N1	N2	N1	N2	N2	N2	N3	N3	N3	N3	N4	N4
	2	N1	N2	N2	N2	N2	N3	N2	N3	N3	N3	N3	N4	N4
	1	N2	N2	N3	N2	N3	N3	N3	N3	N3	N4	N4	N4	N5
B	3	N2	N2	N3	N2	N3	N3	N3	N3	N4	N4	N4	N4	N5
	2.5	N2	N3	N3	N3	N3	N3	N3	N4	N4	N4	N4	N5	N5
	2	N2	N3	N3	N3	N3	N4	N3	N4	N4	N4	N5	N5	N6
	1	N3	N3	N4	N3	N4	N4	N4	N4	N5	N5	N5	N6	N6
C	3	C1 (0-50)	C2 (0-10) C1 (10-50)	C2 (0-20) C1 (20-50)	C2 (0-5) C1 (5-50)	C2 (0-30) C1 (30-50)	C2 (0-40) C1 (40-50)	C2 (0-25) C1 (25-50)	C3 (0-5) C2 (5-50)	C3 (0-20) C2 (20-50)	C3 (0-25) C2 (25-50)	C3 (0-30) C2 (30-50)	C4 (0-10) C3 (10-50)	C4 (0-35) C3 (35-50)
	2.5	C1 (0-50)	C2 (0-25) C1 (25-50)	C2 (0-35) C1 (35-50)	C2 (0-20) C1 (20-50)	C2 (0-40) C1 (40-50)	C3 (0-10) C2 (10-50)	C2 (0-35) C1 (35-50)	C3 (0-20) C2 (20-50)	C3 (0-30) C2 (30-50)	C3 (0-35) C2 (35-50)	C4 (0-5) C3 (5-50)	C4 (0-25) C3 (25-50)	NA (0-15) C4 (15-50)
	2	C2 (0-10) C1 (10-50)	C2 (0-35) C1 (35-50)	C2 (0-45) C1 (45-50)	C2 (0-30) C1 (30-50)	C3 (0-10) C2 (10-50)	C3 (0-25) C2 (25-50)	C3 (0-10) C2 (10-50)	C3 (0-30) C2 (30-50)	C3 (0-40) C2 (40-50)	C4 (0-10) C3 (10-50)	C4 (0-20) C3 (20-50)	NA (0-5) C4 (5-50)	NA (0-25) C4 (25-50)
	1	C2 (0-30) C1 (30-50)	C3 (0-10) C2 (10-50)	C3 (0-25) C2 (25-50)	C3 (0-10) C2 (10-50)	C3 (0-30) C2 (30-50)	C4 (0-5) C3 (5-50)	C3 (0-25) C2 (25-50)	C4 (0-10) C3 (10-50)	C4 (0-20) C3 (20-50)	C4 (0-30) C3 (30-50)	NA (0-5) C4 (5-50)	NA (0-25) C4 (25-50)	NA (0-45) C4 (45-50)
D	3	C2 (0-30) C1 (30-50)	C3 (0-10) C2 (10-50)	C3 (0-25) C2 (25-50)	C3 (0-5) C2 (5-50)	C3 (0-35) C2 (35-50)	C3 (0-50)	C3 (0-30) C2 (30-50)	C4 (0-5) C3 (5-50)	C4 (0-20) C3 (20-50)	C4 (0-30) C3 (30-50)	C4 (0-40) C3 (40-50)	NA (0-25) C4 (25-50)	NA (0-50)
	2.5	C2 (0-50)	C3 (0-25) C2 (25-50)	C3 (0-40) C2 (40-50)	C3 (0-25) C2 (25-50)	C3 (0-50)	C4 (0-15) C3 (15-50)	C3 (0-45) C2 (45-50)	C4 (0-25) C3 (25-50)	C4 (0-40) C3 (40-50)	NA (0-5) C4 (5-50)	NA (0-20) C4 (20-50)	NA (0-40) C4 (40-50)	NA (0-50)
	2	C3 (0-10) C2 (10-50)	C3 (0-40) C2 (40-50)	C4 (0-5) C3 (5-50)	C3 (0-35) C2 (35-50)	C4 (0-15) C3 (15-50)	C4 (0-30) C3 (30-50)	C4 (0-10) C3 (10-50)	C4 (0-40) C3 (40-50)	NA (0-15) C4 (15-50)	NA (0-20) C4 (20-50)	NA (0-35) C4 (35-50)	NA (0-50)	NA (0-50)
	1	C3 (0-35) C2 (35-50)	C4 (0-15) C3 (15-50)	C4 (0-30) C3 (30-50)	C4 (0-10) C3 (10-50)	C4 (0-40) C3 (40-50)	NA (0-15) C4 (15-50)	C4 (0-35) C3 (35-50)	NA (0-25) C4 (25-50)	NA (0-40) C4 (40-50)	NA (0-45) C4 (45-50)	NA (0-50)	NA (0-50)	NA (0-50)

Legend:
FS = Full shielding
PS = Partial shielding
NS = No shielding
N = Non-cyclonic
C = Cyclonic

Note: For wind regions C and D, site wind classification is given according to the distance (km) from the smoothed boundary (coastline or higher wind region).

Wind Class	Limit state design gust wind speed (m/s)	
	Serviceability	Ultimate
N1	26	34
N2	26	40
N3	32	50
N4	39	61
N5	47	74
N6	55	86
C1	32	50
C2	39	61
C3	47	74
C4	55	86

Note: N1~N6 are non-cyclonic wind classes, C1~C4 are cyclonic wind classes.

1) Choose your Wind Region based on your dwelling location. (Step 1)

2) Determine the appropriate Terrain Category. (Step 2)

3) Select the type of shielding your site has. (Step 3)

4) Establish the Topography of your area. (Step 4)

5) Determine wind class (Step 5)

EXAMPLES OF THE WIND CLASSIFICATION FOR CITIES AROUND AUSTRALIA

	Place	Region	Terrain Category	Shielding	Topography	Wind Class
1	House in the Suburbs - flat	A	TC3	FS	T1	N1
		B				N2
		C				C1/C2
		D				C2/C3
2	Sydney in the suburbs - flat	A	TC3	FS	T1	N1
	- on acreage	A	TC2.5	NS	T1	N2
3	Melbourne, Hobart, Adelaide & Perth in the suburbs - on top of a hill	A	TC3	NS	T3	N3
4	Brisbane in the suburbs - flat	B	TC3	FS	T1	N2
	- on top of a steep hill	B	TC3	NS	T5	N5
5	Hervey Bay, Cairns & Darwin in the suburbs - flat away from the beach	C	TC3	NS	T1	C1/C2
	- on acreage - flat	C	TC2.5	NS	T1	C2/C3

AUSTRALIAN STANDARDS

Australian Standard	Definition
AS 4055:2021	Wind loads for housing
AS/NZS 1170.2:2021	Structural design actions, Part 2: Wind actions

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