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

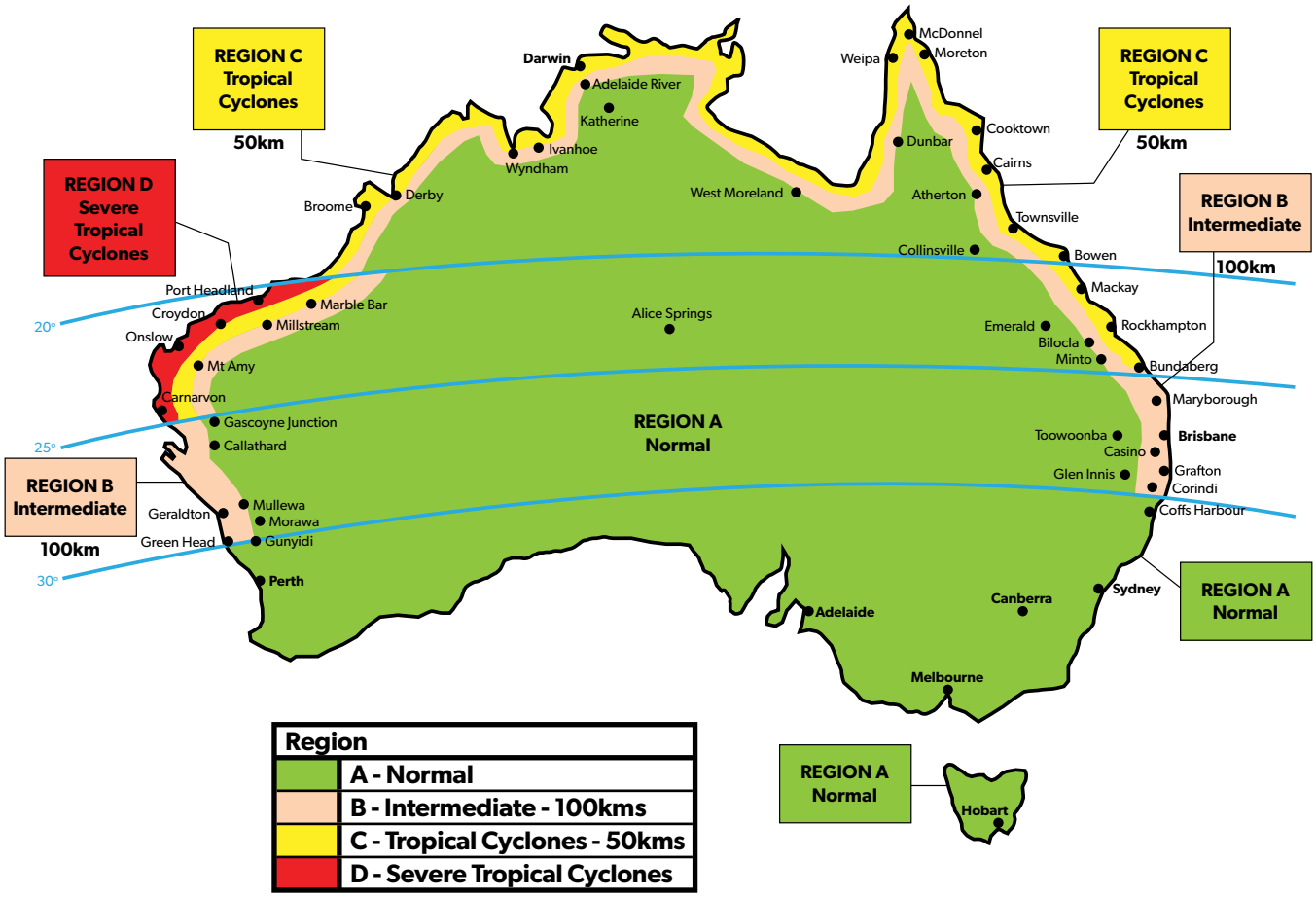
Step 4: Select your Topographic Classification

Step 5: Determine the Wind Classification

Step 6: Determine design Wind Speed

STEP 1. WIND REGION

Choose your wind region based on the dwelling location.

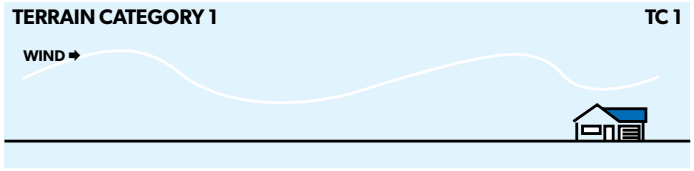


STEP 2. TERRAIN CATEGORY

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

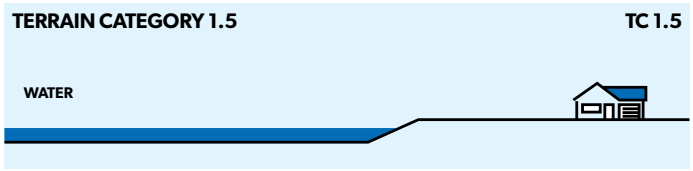
CATEGORY 1 – TC1

Very exposed open terrain with few or no obstructions and enclosed limited sized water surfaces, e.g. flat, treeless, poorly grassed plains, or river, canals, lakes and enclosed bays, extending less than 10 km in the wind direction.



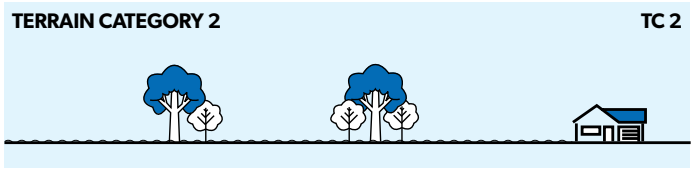
CATEGORY 1.5 – TC1.5

Open water surfaces subjected to shoaling waves, e.g. near-shore water, large unenclosed bays on seas and oceans, lakes and enclosed bays extending greater than 10km in the wind direction.



CATEGORY 2 – TC2

Open terrain including grassland with well-scattered obstructions having heights generally from 1.5m to 5m with no more than two obstructions per hectare, e.g. farmland and cleared subdivisions with isolated trees 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 large acreage development with fewer than 10 buildings per hectare.

CATEGORY 3 – TC3

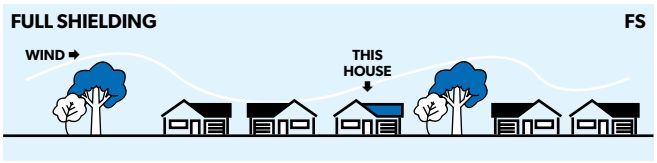
Terrain with numerous closely spaced obstructions having heights generally from 3m to 10m. The minimum density of obstructions shall be at least the equivalent of
10 house-size obstructions per hectare, e.g. "suburban housing, light industrial estates".

STEP 3. SHIELDING FACTOR

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

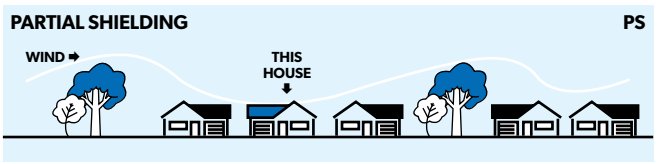
FULL SHIELDING – FS

Full shielding where at least two rows of houses or similar size permanent obstructions surround the house being considered. In Regions A & B, heavily wooded areas within 100m of site provide full shielding. The effects of roads or other open areas with less than 100m measured in any direction shall be ignored. Full shielding is for typical suburban development greater than 10 houses per hectare. The first two rows of houses abutting permanent open areas with a least dimension greater than 100m, such as parklands, large expanses of water and airfields, shall be considered to have either partial shielding or no shielding.



PARTIAL SHIELDING – PS

Partially shielded where there are a least 2.5 houses, trees or sheds per hectare such as acreage type suburban development or wooden parkland. The second row of houses are classified as partially shielded.



NO SHIELDING – NS

No shielding 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.

STEP 4. TOPOGRAPHY EFFECT

The topographic classification is determined by the effect the wind has on the dwelling due to its position on the hill, designated to be T5.

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**			**Over Top**
			H<10m	**10m<H<30m**	**H >30m**	
≤ 1:20 Very Flat	T0	T0	T0	T0	T0	T0
≥ 1:20 to ≤ 1:10 Flat	T0	T0	T1	T1	T1	T0
≥ 1:10 to ≤ 1:7.5 Small Hill	T0	T1	T1	T2	T2	T0
≥ 1:7.5 to ≤ 1:5 Medium Hill	T0	T1	T2	T2	T3	T1
≥ 1:5 to ≤ 1:3 Big Hill	T0	T2	T2	T3	T4	T2
≥ 1:3 Cliff	T0	T2	T3	T4	T5	T3

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

STEP 5. WIND CLASSIFICATION

WIND CLASSIFICATION SYSTEM FROM AS4055-2012 WIND LOAD FOR HOUSING

AS 4055 sets out 10 wind classes N1~N6 & 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 class												
		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
	1.5	N2	N2	N2	N2	N3	N3	N3	N3	N3	N3	N4	N4	N5
	1	N2	N3	N3	N2	N3	N3	N3	N3	N4	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
	1.5	N3	N3	N4	N3	N4	N4	N4	N4	N4	N5	N5	N5	N6
	1	N3	N4	N4	N4	N4	N4	N4	N5	N5	N5	N5	N6	N6
C	3	C1	C1	C2	C1	C2	C2	C2	C2	C3	C3	C3	C3	C4
	2.5	C1	C2	C2	C2	C2	C2	C2	C3	C3	C3	C3	C4	N/A
	2	C1	C2	C2	C2	C2	C3	C2	C3	C3	C3	C4	C4	N/A
	1.5	C2	C2	C3	C2	C3	C3	C3	C3	C4	C4	C4	N/A	N/A
	1	C2	C3	C3	C3	C3	C3	C3	C4	C4	C4	N/A	N/A	N/A
D	3	C2	C3	C3	C2	C3	C3	C3	C4	C4	C4	C4	N/A	N/A
	2.5	C2	C3	C3	C3	C3	C4	C3	C4	C4	C4	N/A	N/A	N/A
	2	C3	C3	C4	C3	C4	C4	C4	C4	N/A	N/A	N/A	N/A	N/A
	1.5	C3	C4	C4	C4	C4	N/A	C4	N/A	N/A	N/A	N/A	N/A	N/A
	1	C3	C4	C4	C4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Legend:
FS = Full shielding
PS = Partial shielding
NS = No shielding
N = Non-cyclonic
C = Cyclonic
N/A = Not Available, refer to AS/NZS 1170.2

Wind Class	Common Notation	Limit state design gust wind speed (m/s)	
		Serviceability	Ultimate
N1	W28	26	34
N2	W33	26	40
N3	W41	32	50
N4	W50	39	61
N5	W60	47	74
N6	W70	55	86
C1	W41C	32	50
C2	W50C	39	61
C3	W60C	47	74
C4	W70C	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. (Section 1)

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

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

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

EXAMPLES OF THE WIND CLASSIFICATION FOR CITIES AROUND AUSTRALIA

	Place	Region	Terrain Category	Shielding	Topography	Wind Class	Common Notation
1	House in the Suburbs - flat	A	TC3	FS	T1	N1	W28
		B				N2	W33
		C				C1	W41C
		D				C2	W50C
2	Sydney in the suburbs - flat		TC3	FS	T1	N1	W28
	- on acreage	A	TC2.5	NS	T1	N2	W33
	- on top of a steep hill/cliff at beach		TC1.5	NS	T5	N5	W60
3	Melbourne, Hobart, Adelaide & Perth in the suburbs			FS	T1	N1	W28
	- flat	A	TC3				
	- on top of a hill			NS	T3	N3	W41
4	Brisbane in the suburbs		TC3	FS	T1	N2	W33
	- flat	B					
	- on top of a steep hill		TC3	NS	T5	N5	W60
5	Hervey Bay, Cairns & Darwin in the suburbs		TC3	FS	T1	C1	W41C
		C					
	- flat away from the beach		TC2.5	NS	T1	C2	W50C
	- on acreage - flat						
6	Broome, WA in suburbs - flat	C	TC1.5	FS	T1	C2	W50C
7	Karratha, Dampier, Carnarvon WA in suburbs		TC1.5	FS		C3	W60C
		D			T0		
	- flat		TC1.5	NS		C4	W70C
	- suburbs near beach						

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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