

Determining Wind Speed

 STRATCO



SELECTION PROCEDURE

To identify a Rationalised Gust Wind Speed for a proposed building site, there are four variables you must first identify. They are Region (figure 1), Terrain Category, Shielding Factor and Topographic Classification. The Rationalised Gust Wind Speed can then be determined using table 2.

If the wind classification (as defined in AS4055-1992) is known, the gust wind speed can be taken from table 1.

*This is an approximate method for estimating wind speeds for residential structures only. For full analysis refer to Australian Standard AS/NZS1170.2:2002.

WIND CLASSIFICATION CONVERSION TABLE

WIND CLASSIFICATION		Gust Wind Speed meters per second
Regions A1-A5 and B	Regions C and D	
N1 (Non-Cyclonic)	N/A	W28
N2 (Non-Cyclonic)	N/A	W33
N3 (Non-Cyclonic)	C1 (Cyclonic)	W41
N4 (Non-Cyclonic)	C2 (Cyclonic)	W50
N5 (Non-Cyclonic)	C3 (Cyclonic)	W60

Table 1

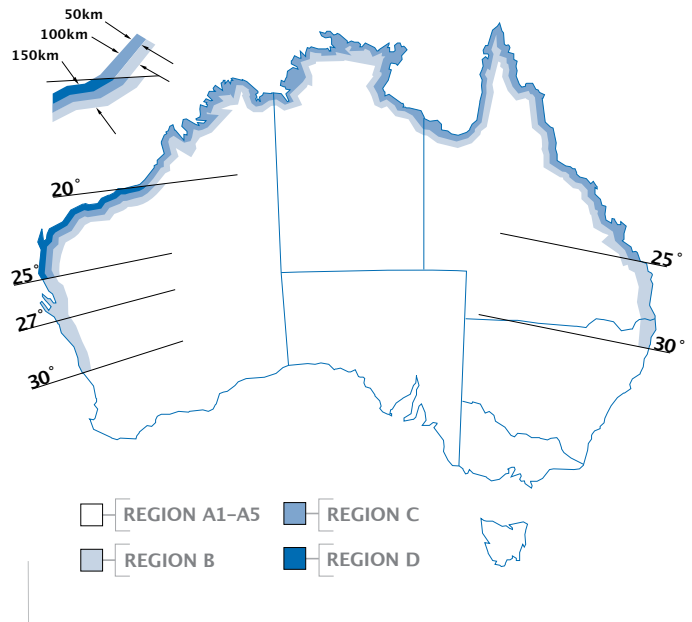


Figure 1

RATIONALISED GUST WIND SPEED* Vz (m/s). NON-CYCLONIC REGION A1-A5 AND B AND CYCLONIC REGION C AND D

Region	Terrain Category	TOPOGRAPHIC CLASSIFICATION								
		T1			T2			T3		
		FS	PS	NS	FS	PS	NS	FS	PS	NS
A1-A5	3	W28	W28	W33	W33	W33	W36	W33	W36	W41
	2.5	W28	W33	W36	W33	W36	W41	W36	W41	W50
	2	W33	W36	W41	W36	W41	W50	W41	W50	W50
	1	W36	W41	W50	W41	W50	W50	W50	W50	W55
B	3	W33	W36	W41	W36	W41	W50	W41	W50	W50
	2.5	W36	W41	W50	W41	W50	W50	W50	W50	W55
	2	W41	W50	W50	W50	W50	W55	W50	W55	W60
	1	W50	W50	W55	W50	W55	W60	W55	W60	N/A
C	3	W41	W50	W55	W50	W55	W60	W55	W60	N/A
	2.5	W50	W50	W55	W50	W60	N/A	W55	N/A	N/A
	2	W50	W55	W60	W55	W60	N/A	W60	N/A	N/A
	1	W50	W55	W60	W55	W60	N/A	W60	N/A	N/A
D	3	W55	W60	N/A	W60	N/A	N/A	N/A	N/A	N/A
	2.5	W55	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	2	W60	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	1	W60	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Table 2

TERRAIN CATEGORY

The wind speed at a structure is influenced by the terrain it flows over as it approaches the structure. The terrain category classifications can be described as follows:

Category 1

Exposed open terrain with few or no obstructions. This condition is rare and exists only for isolated buildings in flat, treeless, poorly grassed plains of at least 10km width.

Category 2

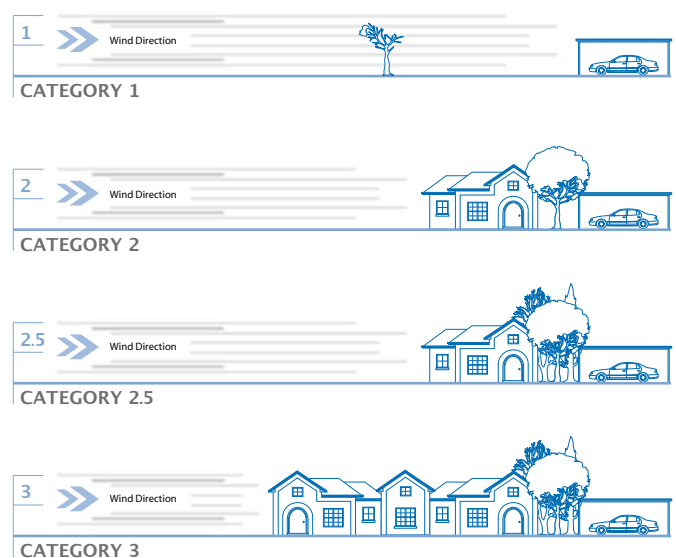
Open terrain, grassland with few well scattered obstructions having heights generally from 1.5 metres to 10.0 metres.

Category 2.5

Terrain with few trees and isolated obstructions. This is an intermediate classification between Category 2 and 3.

Category 3

Terrain with numerous closely spaced obstructions such as areas of suburban housing. (3.0 metres to 5.0 metres high)



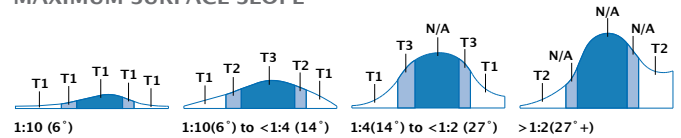
TOPOGRAPHIC EFFECT

The Equivalent Maximum Surface Slope is the slope of the steepest 20 metre segment of ground directly downhill from the proposed building site on the hill, ridge or escarpment being considered. Often The Equivalent Maximum Surface Slope will not occur at the actual proposed building site.

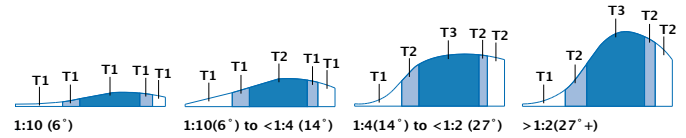
In steeply folded topography, the Equivalent Maximum Surface Slope shall be the direction giving the highest topographical classification.

Topographic classification T1 shall apply to all hills, ridges and escarpments if the hills are less than 25 metres high for Terrain Category 3, 20 metres for Category 2.5, 15 metres for Category 2 or if the surface inclination is less than 1 in 10.

MAXIMUM SURFACE SLOPE



HILL WIND DIRECTION



ESCARPMENT WIND DIRECTION

□ Lower 1/3 ■ Middle 1/3 ■ Top 1/3

SHIELDING FACTOR

Shielding classification is required because the wind speed at a structure is influenced by any upwind obstructions of similar size to the structure that are close to the building. The three shielding classifications are defined as follows:

FS – Represents Full Shielding

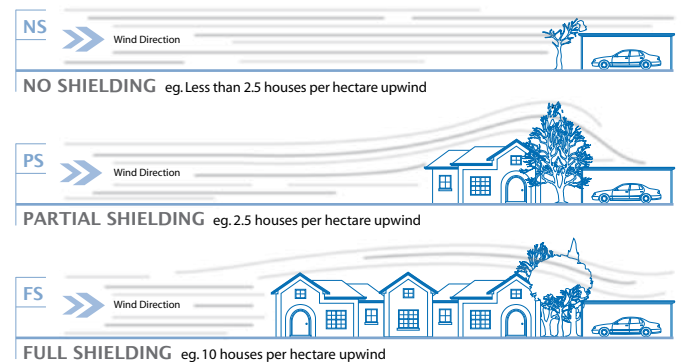
Full Shielding is where at least two rows of houses or similar sized permanent obstructions surround the building being considered. In regions A and B, heavily vegetated areas can provide Full Shielding. The application of Full Shielding is considered appropriate for typical suburban development, equal to or greater than 10 houses and/or similar sized obstructions per hectare.

PS – Represents Partial Shielding

Partial Shielding applies to intermediate situations where there are at least 2.5 houses, trees, or sheds per hectare upwind of the structure. e.g. Typical “acreage” type suburban development or wooded parklands.

NS – Represents No Shielding

No Shielding occurs where there are no (or less than 2.5 obstructions per hectare) permanent obstructions upwind. e.g. The first two rows of houses or single houses abutting open water, airfields and open parklands.



DESIGN FACTORS

Wind speeds have been determined using the following factors, in accordance with AS1170.2-2002. 500 year design return period and a maximum ten metre structure height.

Note: Wind speeds have been reduced by a factor of 1.5 from ultimate limit state to give permissible wind gust as is commonly used.

TERRAIN CATEGORIES ($M_{z,cat}$)

Terrain Category	Regions A1-A5 and B	Regions C and D
1	1.12	1.00
2	1.00	1.00
2.5	0.92	0.95
3	0.83	0.89

SHIELDING FACTOR (M_s)

Shielding Classification	Factor
Full Shielding (FS)	0.8
Partial Shielding (PS)	0.9
No Shielding (NS)	1.0

TOPOGRAPHIC EFFECT (M_T)

Topographic Classification	Factor
T1	1.00
T2	1.15
T3	1.28

DIRECTION MULTIPLIER (M_D) – In All Cases a factor of 1.00

NOTE

The method used for calculating the design gust wind speeds has been developed by Stratco with the assistance of suitably qualified engineers in order to comply with the requirements of AS1170.2-2002.

Stratco does not accept liability for any loss or damage suffered as a result of any errors in the interpretation or application of this design guide. Any person wishing to check any calculations made by them pursuant to this method may wish to seek independent engineering advice.

WIND SPEED EXAMPLES

The examples below show typical applications of the rationalised gust wind speeds. For a full analysis refer to AS/NZS1170.2:2002.

CONTACT

1300 165 165



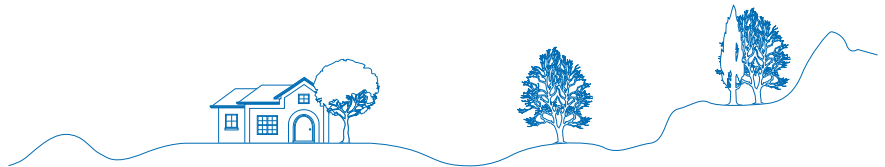
REGION A - W28/N1, REGION B - W33/N2 AND REGION C - W41/C1
Flat Suburbia



REGION A - W33/N2, REGION B - W41/N3 AND REGION C - W50/C2
Structures built adjacent to an oval or large vacant lot subject to prevailing winds.



REGION A - W33/N2, REGION B - W41/N3 AND REGION C - W50/C2
Structures on undulating terrain in suburbia



REGION A - W41/N3, REGION B - W50/N4 AND REGION C - W60/C3
Structure sited in undulating sparsely populated terrain



REGION A - W41/N3, REGION B - W50/N4 AND REGION C - W60/C3
The first two rows of buildings adjacent to the sea front



REGION A - W50/N4 - N/A FOR OTHER AREAS
Extremely severe - Isolated building on the crest of a hill