

WIND LOADING DESIGN GUIDE



APPLICATION
ENGINEERING / WIND LOADS

FEATURES
WIND PRESSURE / TERRAIN CATEGORY / LOCAL PRESSURE / AS/NZS1170.2:2011



This Design Guide, when used in conjunction with the ASKIN Product Specification Sheets, provides an easy to use solution for determining the wind design loads on a wall or roof panel based on the terrain category, region and the height of the building. All calculations are based off a 50 year return period, importance level 3 structure and a flat, unshielded site. Also the **local pressure factor** has been taken as 1.0, however a factor ranging from **1.5x to 3x should be applied** to increase the pressure at certain locations where the structure is more susceptible to high wind pressures (Figure 1). A change in any of these parameters as well as the addition of any parapets will affect the final wind pressure and guidance from a suitably qualified engineer is encouraged.

TERRAIN CATEGORY

The terrain category can be broken down into 5 groups and refers to the terrain located in the direction of the approach winds flowing towards the structure. AS1170.2:2011 lists the different categories as follows:

Category 1 – Exposed open terrain with few or no obstructions and water surfaces at serviceability wind speeds.

Category 2 – Water surfaces, open terrain, grasslands with few, well scattered obstructions having heights generally from 1.5m to 1.0m.

Category 3 – Terrain with numerous closely spaced obstructions 3m to 5m high, such as areas of suburban housing.

Category 4 – Terrain with numerous large, high (10m to 30m high) and closely spaced obstructions, such as large city centres and well-developed industrial complexes.

A further category has also emerged outside of the standard 4 and is quickly becoming an industry standard that is widely used for terrain that sits between Categories 2 and 3, aptly named **Category 2.5**.

REGIONS

Certain locations across Australia and New Zealand are broken up into regions based on the typical wind speeds for that specific area. Australia contains regions A, B, C and D wind zones, whilst New Zealand simply has 2 wind zones which are regions A and W. An extract from AS1170.2:2011 in the appendix shows maps of Australia and New Zealand with the associated wind regions.

HEIGHT

The height (z) listed here for using the wind load tables can simply be taken as the average roof height of the structure. For intermediate values of z, interpolate.

WIND DESIGN LOADS

Allowable ultimate limit state design base wind pressure (kPa) for walls and roofs.

Table 1. WALL & ROOF wind pressure for terrain category 1.

WIND PRESSURE TERRAIN CATEGORY 1 (kPa)					
Height (m)	Region				
0	A	B	C	D	W
≤ 3	1.12	1.91	2.36	3.82	1.49
5	1.26	2.14	2.63	4.26	1.67
10	1.43	2.44	2.92	4.72	1.90
15	1.54	2.62	3.34	5.40	2.04
20	1.62	2.75	3.72	6.03	2.15
25	1.66	2.82	3.96	6.41	2.20
30	1.70	2.89	4.20	6.80	2.26
35	1.73	2.94	4.38	7.08	2.29
40	1.76	2.99	4.56	7.38	2.33

Data generated in accordance with AS/NZS 1170.2:2011



Table 2. WALL & ROOFS wind pressure for terrain category 2.

WIND PRESSURE TERRAIN CATEGORY 2 (kPa)					
Height (m)	Region				
0	A	B	C	D	W
≤ 3	0.95	1.61	2.36	3.82	1.26
5	0.95	1.61	2.63	4.26	1.26
10	1.14	1.94	2.92	4.72	1.52
15	1.26	2.14	3.34	5.40	1.67
20	1.33	2.27	3.72	6.03	1.77
25	1.38	2.35	3.96	6.41	1.84
30	1.43	2.44	4.20	6.80	1.90
35	1.48	2.53	4.38	7.08	1.97
40	1.54	2.62	4.56	7.38	2.04

Data generated in accordance with AS/NZS 1170.2:2011

Table 3. WALL & ROOFS wind pressure for terrain category 3.

WIND PRESSURE TERRAIN CATEGORY 3 (kPa)					
Height (m)	Region				
0	A	B	C	D	W
≤ 3	0.79	1.34	1.87	3.02	1.04
5	0.79	1.34	1.87	3.02	1.04
10	0.79	1.34	2.31	3.74	1.04
15	0.91	1.54	2.63	4.26	1.20
20	1.01	1.72	3.22	5.20	1.34
25	1.08	1.83	3.53	5.71	1.43
30	1.14	1.94	3.86	6.24	1.52
35	1.19	2.02	4.20	6.80	1.58
40	1.24	2.10	4.56	7.38	1.64

Data generated in accordance with AS/NZS 1170.2:2011

Table 4. WALL & ROOFS wind pressure for terrain category 4.

WIND PRESSURE TERRAIN CATEGORY 4 (kPa)					
Height (m)	Region				
0	A	B	C	D	W
≤ 3	0.64	1.09	2.11	3.41	0.85
5	0.64	1.09	2.23	3.61	0.85
10	0.64	1.09	2.61	4.22	0.85
15	0.64	1.09	2.98	4.82	0.85
20	0.64	1.09	3.47	5.61	0.85
25	0.69	1.17	3.74	6.05	0.91
30	0.73	1.24	4.03	6.52	0.97
35	0.78	1.32	4.29	6.94	1.03
40	0.83	1.40	4.56	7.38	1.10

Data generated in accordance with AS/NZS 1170.2:2011



IMPORTANT NOTES

- The above data is to be used in conjunction with the relevant ASKIN product specification sheets to ensure these loads do not exceed the maximum allowable pressure for the panel being considered.
- Local pressure factors have been assumed to be 1.0 in the above tables. In areas where local pressure is present additional loading may apply.

LOCAL PRESSURE FACTORS

The local pressure factor is generally taken as 1.0, however for cladding a value from Table 5.6, AS1170.2:2011 can be applied to increase the pressure at certain locations where the structure is more susceptible to high wind pressures. Figure 1 below outlines the various local pressure factors which may apply and where they act, the value of a is determined simply from the lesser of $0.2 \times$ length of the building, $0.2 \times$ width of the building or the average height (z).

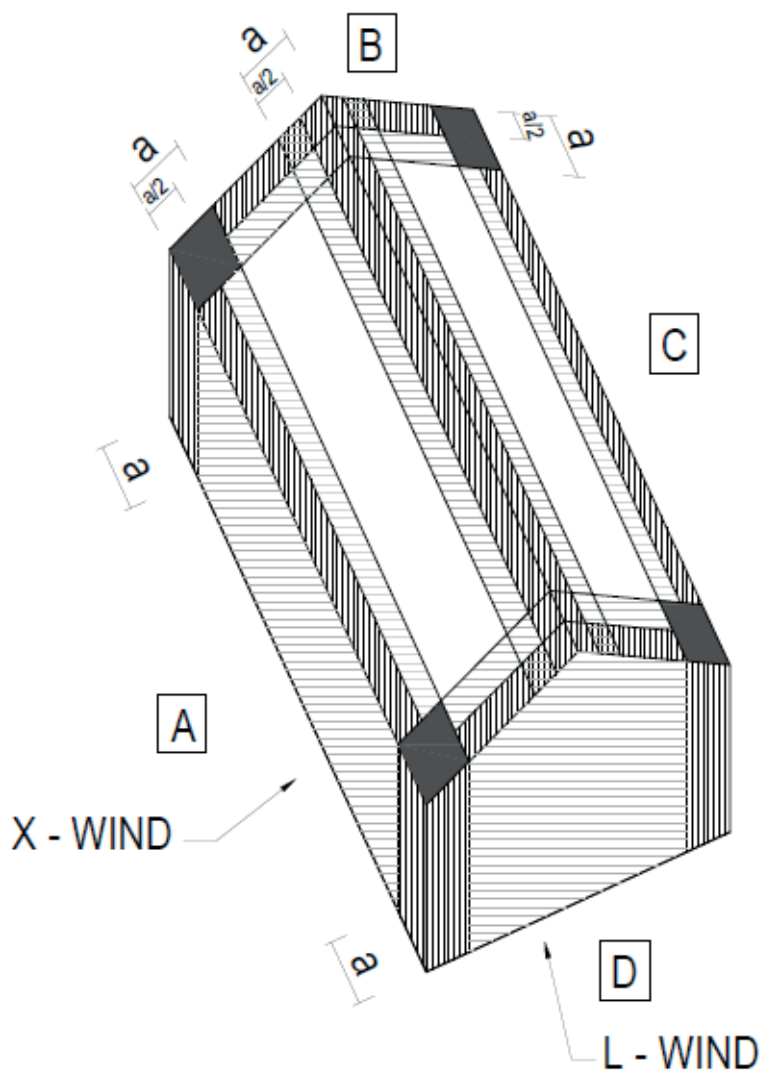


Figure 1. Local wind pressure locations.

- Design for 200% higher wind force
- Design for 100% higher wind force
- Design for 50% higher wind force

For walls a local pressure increase of 1.5 may apply over the specified area, for roofs the local pressure factors vary more significantly an increase in pressure of 3x may apply at the corners of the roof and a 1.5 – 2x increase may apply at the edges or ridge of the roof. It is advised to consult a suitably qualified engineer to determine the extent of the local pressures.

APPENDIX

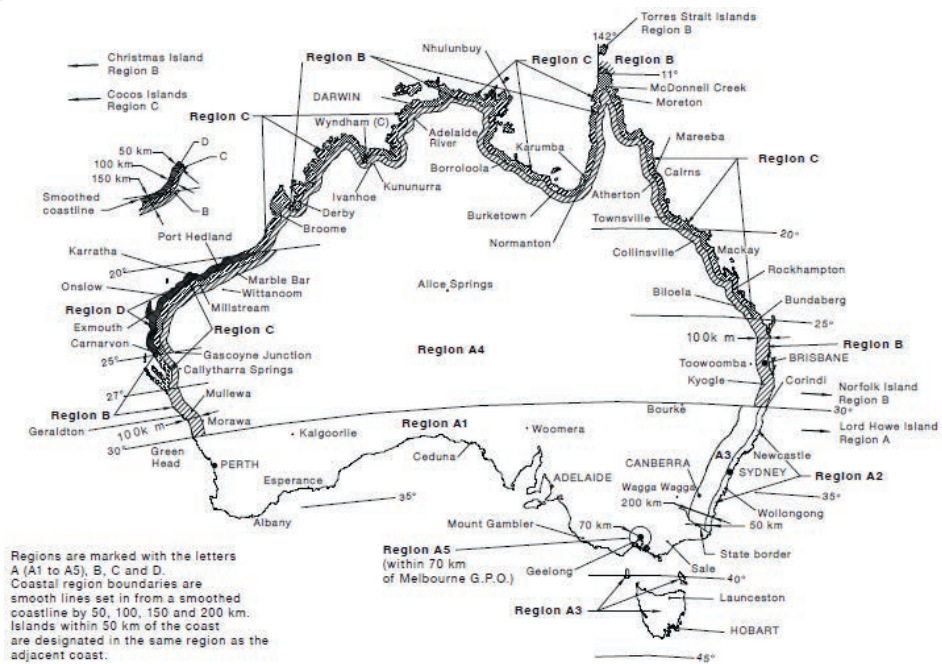


Figure 2. Wind Regions in Australia

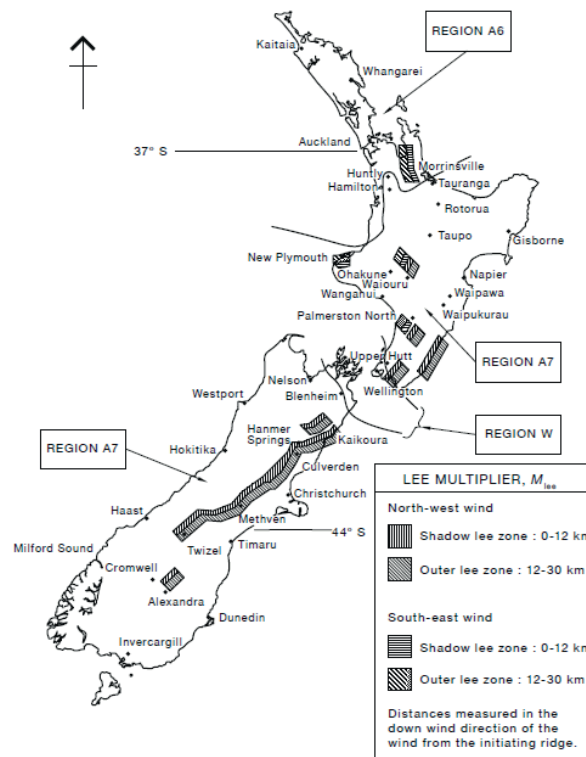


Figure 3. Wind Regions in New Zealand

DISCLAIMER

Information provided here is for design guidance only. Designers are encouraged to seek advice from a suitably qualified professional. All data is subject to change without notice.

