WIND PRESSURE COEFFICIENTS

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You may recall a previous Gang-Nail Guidelines article called "Wind Load For Housing," which discussed the topic of the design wind velocity for houses.

Having obtained the design wind velocity is just the first step in determining the design wind loads on buildings. The second step is, you guessed it, to determine the wind pressure coefficients that are applicable to your building.

We previously discovered that the design wind velocity is dependent upon the geographic region, terrain category, shielding and the topographic location of a building site, whereas the wind pressure coefficients are dependent upon the building geometry and roof pitch.

Both AS 1170.2-1989 - Wind Loads, and AS4055-1989 - Wind Loads for Housing divide the wind pressure coefficient into external (Cp,e) and internal (Cp,i) pressure coefficients.

Table 1 below is a summary of the recommended pressure coefficients for houses from AS4055-1989:

You may observe from the table above that the net wind pressure coefficient is the total combination of the external and the internal pressure coefficients.

The most typical values generally adopted for the external and internal pressure coefficients are - 0.9 and + 0.2, respectively. This results in a net uplift pressure coefficient of - 1.1.

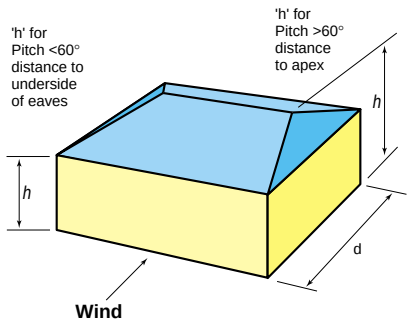
It's worth noting at this point that, positive (+ ve) pressure is wind on to the surface and negative (- ve) pressure is wind away from the surface.

On the other side of the coin, wind can also cause positive downward pressure. This result is shown in Table 1. In this case, the external and internal pressure coefficients are + 0.4 and - 0.3, respectively, which results in a positive downwards pressure of + 0.7.

Using Table 1 is fine if you don't mind being conservative. If you are after a more accurate result then you will need to refer to AS1170.2 - Wind Loads.

Table 2 is taken from AS1170.2 and provides a more appropriate Cp,e value, for hip roofs in domestic construction. For other roof profiles, Cp,e = - 0.9 should be used.

As previously mentioned, when there



Where h = height of building
d = depth of the building parrallel to wind direction
a = roof pitch

are two values listed in the table, the roof should be designed for both positive and negative values and alternative design combinations of external and internal pressures must be considered to obtain the most severe conditions for design.

Note that the above pressure coefficients are only applicable for domestic purposes with roof slopes greater than 10 degrees.

To determine wind pressure coefficients for carports, verandas and roofs with slopes less than 10 degrees refer to AS 1170.2-1989 - Wind Loads or your preferred supplier.

Table 1: Housing Component	External pressure Coefficient ($C_{p,e}$)	Internal pressure Coefficient ($C_{p,i}$)	Net Pressure Coefficient ($C_{p,n}$)
Wind Classification N1 to N6 (Regions A and B)			
Roof trusses and rafters	-0.9 +0.4	+0.2 -0.3	-1.1 +0.7
Walls	+0.7	-0.3	+1.0
Wind Classification C1 to C4 (Regions C and D)			
Roof trusses and rafters	-0.9 +0.4	+0.7 -0.65	-1.6 +1.05
Walls	-0.65	+0.7	-1.35

Table 2: Ratio h/d	Average External Pressure Coefficients ($C_{p,e}$) – **Hip Roofs with slopes ≥ 10°**							
	Roof Pitch (α°) degrees							
	10°	15°	20°	25°	30°	35°	45°	≥60°
≤0.25	-0.7	-0.5	-0.6 +0.2	-0.6 +0.3	-0.6 +0.3	-0.6 +0.4	-0.6 +0.4	-0.6 +0.6
0.5	-0.9	-0.7	-0.6 0.0	-0.6 +0.2	-0.6 +0.2	-0.6 +0.3	-0.6 +0.3	-0.6 +0.6
≥1.0	-1.3	-1.0	-0.7	-0.6 0.0	-0.6 +0.2	-0.6 +0.2	-0.6 +0.2	-0.6 +0.6