

Project :
 Subject :
 Location :

File :
 Date : 3/24/2008
 Eng. :

Design Wind Pressure, p, Equation 6-27 (ASCE 7-05)

Design wind pressures and forces are determined per equations given in section 6.5.14

System Type	Structure Type	Equation
Open Buildings and Other Structures	Rigid Structures Solid Freestanding Walls & Solid Signs	$p = qh \cdot G \cdot C_f$ qh : at height h above ground G : given in 6.5.8.1 C_f : given in Figure 6-20 $F = p \cdot A_s$ A_s : gross area of wall or sign

Velocity Pressure Calculations, qz

Velocity pressure qz is calculated in accordance with section 6.5.10

qz = Velocity pressure @ height (z) (Eq. 6-15)
 qz = Constant · Kz · Kzt · Kd · V² · I
 qz = See wind pressure calculation table

Where :

Constant	= Numerical constant	(Section C6.5.10)
	= $\frac{1}{2} \cdot [(\text{Air density lb/ cu ft}) / (32.2 \text{ ft/s}^2)] \cdot [(\text{mi/h}) (5280 \text{ ft/mi}) \cdot (1 \text{ hr/3600 s})]^2$	
	= 0.00256	
Mean Sea Level	= 0.00 ft	
Air Density @ MSL	= 0.0765 lb/cu ft	(Table C6-13)
Category	= I	(Table 1-1)
Importance Factor	= 0.87	(Table 6-1)
Exposure Category	= C (Open terrain)	
Alpha	= 9.50	(Table 6-2)
Zg	= 900.00 ft	(Table 6-2)
Basic Wind Speed	= 90.00 mph	(Figure 6-1)
Structure Height	= 60.00 ft	

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Velocity Pressure Calculations, qz (Cont.)

Where : K_z = Velocity pressure coefficient at height z (Eq. C6-4a)
= $2.01 \cdot (Z/Z_g)^{2/\alpha}$ for $15 \text{ ft} \leq Z \leq Z_g$ (Eq. C6-4b)
= $2.01 \cdot (15/Z_g)^{2/\alpha}$ for $Z < 15 \text{ ft}$
= See wind pressure calculation table

K_{zt} = Topographic factor obtained from Fig. 6-4
= $(1 + K_1 \cdot K_2 \cdot K_3)^2$
= See wind pressure calculation table

Topography = None

K_d = Wind directionality factor obtained from Table 6-4
= 0.85

Gust Effect Factor, G

The gust effect factor for main wind-force resisting building and other structures and for components and cladding of open buildings is in accordance with section 6.5.8.1

$G = 0.85$

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Design Wind Pressure, p, Equation 6-27

Figure 6-20 (Solid Freestanding Walls & Solid Signs)

Design wind pressures and forces are determined per equations given in section 6.5.14

Horizontal dimension of sign (B) = 20.00 ft
 Height of sign from ground surface to top (h) = 20.00 ft
 Vertical dimension of sign (s) = 5.00 ft
 Ratio of solid area to gross area (epsilon) = 0.90
 Horizontal dimension of return corner (Lr) = 2.50 ft
 Aspect Ratio (B/s) = 4.00
 Clearance Ratio (s/h) = 0.25
 Depth Ratio (Lr/s) = 0.50

Case	Kz	K3	Kzt	Kd	qh (psf)	Cf	p (psf)	F (lbs)
A & B	0.90	1.00	1.00	0.85	13.83	1.74	20.49	2,049.04

Case C

Region	Kz	K3	Kzt	Kd	qh (psf)	Cf	p (psf)	F (lbs)
0 to s	0.90	1.00	1.00	0.85	13.83	2.81	33.01	825.31
s to 2s	0.90	1.00	1.00	0.85	13.83	1.84	21.63	540.72
2s to 3s	0.90	1.00	1.00	0.85	13.83	1.26	14.80	369.97
3s to 4s	0.90	1.00	1.00	0.85	13.83	1.07	12.52	313.05

Sum = 2,049.04