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**Design Wind Pressure, p, Equation 6-23 (ASCE 7-02)**

*Design wind pressures and forces are determined per equations given in section 6.5.12*

System Type	Structure Type	Equation
Components and Cladding	Buildings with h > 60 ft	$p$ : $q \cdot (GC_p) - q_i \cdot (GC_{pi})$ $q = q_z$ : at height z above ground $q = q_h$ : for Leeward and Side Wall $q_i$ : $q_h$ $GC_p$ : given in Figure 6-17 $GC_{pi}$ : given in Figure 6-5

**Velocity Pressure Calculations, qh**

*Velocity pressure qh is calculated in accordance with section 6.5.10*

qz = Velocity pressure @ height (z)  
 $q_z = \text{Constant} \cdot K_z \cdot K_{zt} \cdot K_d \cdot V^2 \cdot I$   
 qz = See wind pressure calculation table

qh = Velocity pressure @ mean roof height (h) (Eq. 6-15)  
 $q_h = \text{Constant} \cdot K_h \cdot K_{zt} \cdot K_d \cdot V^2 \cdot I$   
 qh = Velocity pressure @ mean roof height (h)

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 C6-1)

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)  
 Mean Roof Height = 78.00 ft

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**Velocity Pressure Calculations, qz (Cont.)**

Where : Kh = Velocity pressure coefficient @ height z (Eq. C6-3a)  
 =  $2.01 \cdot (Z/Zg)^{2/\alpha}$  for  $15 \text{ ft} \leq Z \leq Zg$  (Eq. C6-3b)  
 =  $2.01 \cdot (15/Zg)^{2/\alpha}$  for  $Z < 15 \text{ ft}$   
 = 1.20

Kz @ z = Not Used  
 =

Kzt = Topographic factor obtained from Fig. 6-4  
 =  $(1 + K1 \cdot K2 \cdot K3)^2$

Kzt @ h = 1.55

Topography = 2D-Escarpment downwind of crest  
 K1,K2,K3 = Multipliers from Fig. 6-4 to obtain Kzt  
 Lh = 100.00 ft  
 H = 200.00 ft  
 H/Lh = 0.50  
 K1 = 0.43  
 X = 100.00 ft  
 X/Lh = 0.25  
 K2 = 0.94  
 z/Lh = 0.78  
 K3 @ h = 0.61

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

**qh = 28.56 (psf)**

**Internal Pressure Coefficient, GCpi, Figure 6-5**

*The internal pressure coefficients are given in Figure 6-5*

Enclosure Classification	GCpi+	GCpi-	Ri	GCpi+	GCpi-
Partially enclosed buildings	0.55	-0.55	1.00	0.55	-0.55

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**External Pressure Coefficient, GCp, Figure 6-17**

The pressure force coefficient are given in Figure 6-17

Zone	Area (sq. ft.)	Angle (deg)	GCp+	GCp-
1	1.00	15.00	0.50	-0.90
2	1.00	15.00	0.50	-1.70
3	1.00	15.00	0.50	-2.60
4	1.00	All	0.90	-0.90
5	1.00	All	0.90	-1.80

**Design Wind Pressure, p. (psf) , Equation 6-23**

Design wind pressures and forces are determined per equations given in section 6.5.12

Use qh with negative values of GCp

Zone	q = qh (psf)	qi+ = qh (psf)	qi- = qh (psf)	GCp-	GCpi+	GCpi-	p+ (psf)	p- (psf)
1	28.56	28.56	28.56	-0.90	0.55	-0.55	-41.41	-10.00
2	28.56	28.56	28.56	-1.70	0.55	-0.55	-64.26	-32.85
3	28.56	28.56	28.56	-2.60	0.55	-0.55	-89.97	-58.55
4	28.56	28.56	28.56	-0.90	0.55	-0.55	-41.41	-10.00
5	28.56	28.56	28.56	-1.80	0.55	-0.55	-67.12	-35.70

p+ uses GCpi+

p- uses GCpi-

Use qh with positive values of GCp when angle greater than 10 deg.

Zone	q = qh (psf)	qi+ = qh (psf)	qi- = qh (psf)	GCp+	GCpi+	GCpi-	p+ (psf)	p- (psf)
1	28.56	28.56	28.56	0.50	0.55	-0.55	-10.00	29.99
2	28.56	28.56	28.56	0.50	0.55	-0.55	-10.00	29.99
3	28.56	28.56	28.56	0.50	0.55	-0.55	-10.00	29.99

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**Design Wind Pressure of Parapet, p, Equation 6-24 - Load Case A**

$kp = 2.01 \cdot (\text{Parapet Height} / Zg) ^ {2/\text{Alpha}}$

$kpt = (1 + K1 \cdot K2 \cdot K3) ^ 2$ , where z = parapet height in the k3 multiplier

$qp = \text{Constant} \cdot Kp \cdot Kpt \cdot Kd \cdot V ^ 2 \cdot I$

$p = qp (GCp - GCpi)$

Zone	GCp	kp	kpt	qp (psf)	GCpi+	GCpi-	p+ (psf)	p- (psf)
4 - Front	0.90	1.14	1.94	34.12	0.00	0.00	30.71	30.71
5 - Front	0.90	1.14	1.94	34.12	0.00	0.00	30.71	30.71
2 - Back	-1.70	1.14	1.94	34.12	0.00	0.00	-58.01	-58.01
3 - Back	-2.60	1.14	1.94	34.12	0.00	0.00	-88.72	-88.72

p+ uses GCpi+

p- uses GCpi-

**Load Case B**

Zone	GCp	kp	kpt	qp (psf)	GCpi+	GCpi-	p+ (psf)	p- (psf)
4 - Front	-0.90	1.14	1.94	34.12	0.00	0.00	-30.71	-30.71
5 - Front	-1.80	1.14	1.94	34.12	0.00	0.00	-61.42	-61.42
4 - Back	0.90	1.14	1.94	34.12	0.00	0.00	30.71	30.71
5 - Back	0.90	1.14	1.94	34.12	0.00	0.00	30.71	30.71

p+ uses GCpi+

p- uses GCpi-

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**Design Windward Wall Wind Pressures, p, Equation 6-23 for Zone 4**

*Design wind pressures and forces are determined per equations given in table 6.5.12*

*p+ uses GCpi+      p- uses GCpi-*

Heights (feet)	Kz	Kzt	Kd	q = qz (psf)	qi+ = qh (psf)	qi- = qh (psf)	GCp	GCpi+	GCpi-	p+ (psf)	p- (psf)
70.01 - 78.00	1.20	1.55	0.85	28.56	28.56	28.56	0.90	0.55	-0.55	10.00	41.41
60.01 - 70.00	1.17	1.55	0.85	27.92	28.56	28.56	0.90	0.55	-0.55	10.00	40.84
50.01 - 60.00	1.14	1.55	0.85	27.03	28.56	28.56	0.90	0.55	-0.55	10.00	40.03
40.01 - 50.00	1.09	1.55	0.85	26.01	28.56	28.56	0.90	0.55	-0.55	10.00	39.12
30.01 - 40.00	1.04	1.55	0.85	24.82	28.56	28.56	0.90	0.55	-0.55	10.00	38.04
25.01 - 30.00	0.98	1.55	0.85	23.36	28.56	28.56	0.90	0.55	-0.55	10.00	36.73
20.01 - 25.00	0.95	1.55	0.85	22.48	28.56	28.56	0.90	0.55	-0.55	10.00	35.94
15.01 - 20.00	0.90	1.55	0.85	21.45	28.56	28.56	0.90	0.55	-0.55	10.00	35.01
0.00 - 15.00	0.85	1.55	0.85	20.19	28.56	28.56	0.90	0.55	-0.55	10.00	33.88

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**Design Windward Wall Wind Pressures, p, Equation 6-23 for Zone 5**

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*Design wind pressures and forces are determined per equations given in table 6.5.12*

Heights (feet)	Kz	Kzt	Kd	q = qz (psf)	qi+ = qh (psf)	qi- = qh (psf)	GCp	GCpi+	GCpi-	p- (psf)	p+ (psf)
70.01 - 78.00	1.20	1.55	0.85	28.56	28.56	28.56	0.90	0.55	-0.55	10.00	41.41
60.01 - 70.00	1.17	1.55	0.85	27.92	28.56	28.56	0.90	0.55	-0.55	10.00	40.84
50.01 - 60.00	1.14	1.55	0.85	27.03	28.56	28.56	0.90	0.55	-0.55	10.00	40.03
40.01 - 50.00	1.09	1.55	0.85	26.01	28.56	28.56	0.90	0.55	-0.55	10.00	39.12
30.01 - 40.00	1.04	1.55	0.85	24.82	28.56	28.56	0.90	0.55	-0.55	10.00	38.04
25.01 - 30.00	0.98	1.55	0.85	23.36	28.56	28.56	0.90	0.55	-0.55	10.00	36.73
20.01 - 25.00	0.95	1.55	0.85	22.48	28.56	28.56	0.90	0.55	-0.55	10.00	35.94
15.01 - 20.00	0.90	1.55	0.85	21.45	28.56	28.56	0.90	0.55	-0.55	10.00	35.01
0.00 - 15.00	0.85	1.55	0.85	20.19	28.56	28.56	0.90	0.55	-0.55	10.00	33.88