## ASCE 7-16 Wind Pressures

**Wind pressures always calculated using the Flexible Gust Factor**

| | | | |
|---|---|---|---|
| V: Wind Speed | = 120.0 mph | f: Natural Frequency | = 1.940 Hz |
| Zg: Alt above Sea Level | = 0.000 ft | Exp: Exposure Category | = C |
| Cat:Structural Category | = III | | = |
| D: Structure Depth | = 4.033 ft | b: Structure Width | = 4.033 ft |
| B: Damping Coeff. (beta) | = 0.011 | Zmin: Const from Table 6-2 | = 15.000 |
| ATri: Const from Table 6-2 | = 0.105 | Btri: Const from Table 6-2 | = 1.000 |
| Amean: Const from Table 6-2 | = 0.154 | Bmean: Const from Table 6-2 | = 0.650 |
| C: Const from Table 6-2 | = 0.200 | Epsilon: Const from Table 6-2 | = 0.200 |
| Stack Elev Above Grade | = 0.0 ft | Stack Enclosed to Elev | = 0.0 ft |

| | | |
|---|---|---|
| Rho | = Air Density | = 0.0765 lb/ft^3 |
| Dm | = Average Diameter | = 3.000 ft |
| Cf | = Shape factor of Cylinder | = 0.700 |
| ma | = Average mass of top 1/3 of stack | = 95.54 lb/ft |
| Ba | = Aerodynamic Damping (Eqn 5-1): (Cf*Rho*Dm*Vzmean) / (4*PI*ma*f) | = 0.0087 |
| Zmean | = 0.6 * H | = 60.000 |
| Izm | = c * (33 / Zmean) ^ (1 / 6) | = 0.181 |
| Lzmean | = l * (Zmean / 33) ^ eps | = 563.505 |
| Q | = Sqrt(1/(1+.63*((b+h)/Lzmean)^.63)) | = 0.906 |
| Kd | = Directionality factor | = 1.000 |
| Kzt | = Terrain factor | = 1.000 |
| Zg | = Elevation above Sea Level | = 0 ft |
| Ke | = Ground Elevation Factor: Ke = e^-(0.0000362*Zg) {Table 26.9-1} | = 1.000 |

Per ASCE 7, since f > 1 Hz the structure is considered to be rigid.

Gust factor (Flexible Or Dynamically sensitive Structure) :

*User has elected to always use the flexible gust factor to be conservative*

| | | |
|---|---|---|
| V0 | = Wind Velocity converted to ft/s | = 145.5 ft/s |
| VZmean | = Bmean * (Zmean/33)^Amean * V0 | = 125.4 ft/s |
| N1 | = f * Lzmean / VZmean | = 8.715 Hz |
| Rn | = 7.465 * N1 / (1 + 10.302 * N1)^(5/3) | = 0.035 |
| nh | = 4.6 * f * h / VZmean | = 7.114 |
| Rh | = (1 / nh) - (1 / (2 * nh^2)) *(1 - Exp(-2*nh)) | = 0.131 |
| nb | = 4.6 * f * b / VZmean | = 0.287 |
| Rb | = (1 / nb) - (1 / (2 * nb^2)) * (1 - Exp(-2 * nb)) | = 0.833 |
| nd | = 15.4 * f * d / VZmean | = 0.961 |
| Rd | = (1 / nd) - (1 / (2 * nd^2)) * (1 - Exp(-2 * nd)) | = 0.579 |
| R | = Sqrt((1 / Beta) * Rn * Rh * Rb * (.53 + .47 * Rd)) | = 0.539 |
| g | = (2 * Ln(3600 * NF1))^0.5 + 0.577 / (2 * Ln(3600 * NF1))^0.5 | = 4.345 |
| G | = .925*((1+1.7*Izm*(3.4^2 * Q^2 +g^2 * R^2)^.5)/(1+1.7*3.4*Izm)) | = 0.991 |
| qz | = 0.00256 * Kzt * Kd * Ke * V^2 | = 36.86 psf |

| Elevation ft | Kz | Qz psf | Pressure psf |
|---|---|---|---|
| 100.0 | 1.266 | 46.66 | 46.22 |
| 90.0 | 1.238 | 45.63 | 45.20 |
| 80.0 | 1.208 | 44.51 | 44.09 |
| 70.0 | 1.174 | 43.28 | 42.87 |
| 66.667 | 1.162 | 42.84 | 42.43 |
| 56.667 | 1.123 | 41.40 | 41.01 |
| 55.0 | 1.116 | 41.14 | 40.75 |
| 53.333 | 1.109 | 40.87 | 40.49 |
| 51.667 | 1.101 | 40.60 | 40.22 |
| 50.0 | 1.094 | 40.32 | 39.94 |
| 40.0 | 1.044 | 38.47 | 38.11 |
| 30.0 | 0.982 | 36.21 | 35.87 |
| 20.0 | 0.902 | 33.25 | 32.93 |
| 10.0 | 0.849 | 31.29 | 31.00 |

1. Pressure = Qz * G
2. Kz = 2.01 * (Elevation / Zg)^(2/Alpha) [If Elevation > 15 ft (4.572 m)]
3. Kz = 2.01 * (15 / Zg)^(2/Alpha) [If Elevation <= 15 ft (4.572 m)]