Table 27.2-1 Steps to Determine MWFRS Wind Loads for Enclosed, Partially Enclosed and Open Buildings of All Heights

Step 1: Determine risk category of building or other structure, see Table 1.4-1

Step 2: Determine the basic wind speed, V, for the applicable risk category, see Figure 26.5-1A, B or C

Step 3: Determine wind load parameters:
- Wind directionality factor, K_d, see Section 26.6 and Table 26.6-1
- Exposure category, see Section 26.7
- Topographic factor, K_{zt}, see Section 26.8 and Table 26.8-1
- Gust Effect Factor, G, see Section 26.9
- Enclosure classification, see Section 26.10
- Internal pressure coefficient, (GC_{pi}), see Section 26.11 and Table 26.11-1

Step 4: Determine velocity pressure exposure coefficient, K_z or K_h, see Table 27.3-1

Step 5: Determine velocity pressure q_z or q_h Eq. 27.3-1

Step 6: Determine external pressure coefficient, C_p or C_N
- Fig. 27.4-1 for walls and flat, gable, hip, monoslope or mansard roofs
- Fig. 27.4-2 for domed roofs
- Fig. 27.4-3 for arched roofs
- Fig. 27.4-4 for monoslope roof, open building
- Fig. 27.4-5 for pitched roof, open building
- Fig. 27.4-6 for troughed roof, open building
- Fig. 27.4-7 for along-ridge/valley wind load case for monoslope, pitched or troughed roof, open building

Step 7: Calculate wind pressure, p, on each building surface
- Eq. 27.4-1 for rigid buildings
- Eq. 27.4-2 for flexible buildings
- Eq. 27.4-3 for open buildings

27.3.2 Velocity Pressure

Velocity pressure, q_z, evaluated at height z shall be calculated by the following equation:

$$q_z = 0.00256 K_z K_{zt} K_d V^2 \text{ (lb/ft}^2\text{)} \qquad (27.3\text{-}1)$$

[In SI: $q_z = 0.613 K_z K_{zt} K_d V^2$ (N/m^2); V in m/s]

where

K_d = wind directionality factor, see Section 26.6
K_z = velocity pressure exposure coefficient, see Section 27.3.1
K_{zt} = topographic factor defined, see Section 26.8.2
V = basic wind speed, see Section 26.5
q_z = velocity pressure calculated using Eq. 27.3-1 at height z
q_h = velocity pressure calculated using Eq. 27.3-1 at mean roof height h.

The numerical coefficient 0.00256 (0.613 in SI) shall be used except where sufficient climatic data are available to justify the selection of a different value of this coefficient for a design application.

27.4 WIND LOADS—MAIN WIND FORCE-RESISTING SYSTEM

27.4.1 Enclosed and Partially Enclosed Rigid Buildings

Design wind pressures for the MWFRS of buildings of all heights shall be determined by the following equation:

$$p = qGC_p - q_i(GC_{pi}) \text{ (lb/ft}^2\text{) (N/m}^2\text{)} \qquad (27.4\text{-}1)$$

where

$q = q_z$ for windward walls evaluated at height z above the ground
$q = q_h$ for leeward walls, side walls, and roofs, evaluated at height h
$q_i = q_h$ for windward walls, side walls, leeward walls, and roofs of enclosed buildings and for negative internal pressure evaluation in partially enclosed buildings
$q_i = q_z$ for positive internal pressure evaluation in partially enclosed buildings where height z is defined as the level of the highest opening in the building that could affect the positive internal pressure. For buildings sited in wind-borne debris regions, glazing that is not impact resistant or protected with an impact resistant covering shall be treated as an opening in accordance with Section 26.10.3. For positive internal pressure evaluation, q_i may conservatively be evaluated at height $h(q_i = q_h)$
G = gust-effect factor, see Section 26.9
C_p = external pressure coefficient from Figs. 27.4-1, 27.4-2 and 27.4-3
(GC_{pi}) = internal pressure coefficient from Table 26.11-1

q and q_i shall be evaluated using exposure defined in Section 26.7.3. Pressure shall be applied simultaneously on windward and leeward walls and on roof surfaces as defined in Figs. 27.4-1, 27.4-2 and 27.4-3.