

## PART 2: ENCLOSED SIMPLE DIAPHRAGM BUILDINGS WITH $h \leq 160$ ft (48.8 m)

### 27.5 GENERAL REQUIREMENTS

#### 27.5.1 Design Procedure

The procedure specified herein applies to the determination of MWFRS wind loads of enclosed simple diaphragm buildings, as defined in Section 26.2, with a mean roof height  $h \leq 160$  ft (48.8 m). The steps required for the determination of MWFRS wind loads on enclosed simple diaphragm buildings are shown in Table 27.5-1.

**User Note:** Part 2 of Chapter 27 is a simplified method for determining the wind pressures for the MWFRS of enclosed, simple diaphragm buildings whose height  $h$  is  $\leq 160$  ft (48.8 m). The wind pressures are obtained *directly from a table*. The building may be of any general plan shape and roof geometry that matches the specified figures. This method is a simplification of the traditional “all heights” method (Directional Procedure) contained in Part 1 of Chapter 27.

**Table 27.5-1 Steps to Determine MWFRS Wind Loads Enclosed Simple Diaphragm Buildings ( $h \leq 160$  ft. (48.8 m))**

<b>Step 1:</b> Determine risk category of building or other structure, see Table 1.5-1
<b>Step 2:</b> Determine the basic wind speed, $V$ , for applicable risk category, see Figure 26.5-1A, B or C
<b>Step 3:</b> Determine wind load parameters: <ul style="list-style-type: none"> <li>➤ Wind directionality factor, <math>K_d</math>, see Section 26.6 and Table 26.6-1</li> <li>➤ Exposure category B, C or D, see Section 26.7</li> <li>➤ Topographic factor, <math>K_{zt}</math>, see Section 26.8 and Figure 26.8-1</li> <li>➤ Enclosure classification, see Section 26.10</li> </ul>
<b>Step 4:</b> Enter table to determine net pressures on walls at top and base of building respectively, $p_h$ , $p_o$ , Table 27.6-1
<b>Step 5:</b> Enter table to determine net roof pressures, $p_z$ , Table 27.6-2
<b>Step 6:</b> Determine topographic factor, $K_{zt}$ , and apply factor to wall and roof pressures (if applicable), see Section 26.8
<b>Step 7:</b> Apply loads to walls and roofs simultaneously.

#### 27.5.2 Conditions

In addition to the requirements in Section 27.1.2, a building whose design wind loads are determined in accordance with this section shall meet all of the following conditions for either a Class 1 or Class 2 building (see Fig. 27.5-1):

##### Class 1 Buildings:

1. The building shall be an enclosed simple diaphragm building as defined in Section 26.2.
2. The building shall have a mean roof height  $h \leq 60$  ft (18.3 m).
3. The ratio of  $L/B$  shall not be less than 0.2 nor more than 5.0 ( $0.2 \leq L/B \leq 5.0$ ).
4. The topographic effect factor  $K_{zt} = 1.0$  or the wind pressures determined from this section shall be multiplied by  $K_{zt}$  at each height  $z$  as determined from Section 26.8. It shall be permitted to use one value of  $K_{zt}$  for the building calculated at  $0.33h$ . Alternatively it shall be permitted to enter the pressure table with a wind velocity equal to  $V\sqrt{K_{zt}}$  where  $K_{zt}$  is determined at a height of  $0.33h$ .

##### Class 2 Buildings:

1. The building shall be an enclosed simple diaphragm building as defined in Section 26.2.
2. The building shall have a mean roof height  $60$  ft  $< h \leq 160$  ft ( $18.3$  m  $< h \leq 48.8$  m).
3. The ratio of  $L/B$  shall not be less than 0.5 nor more than 2.0 ( $0.5 \leq L/B \leq 2.0$ ).
4. The fundamental natural frequency (Hertz) of the building shall not be less  $75/h$  where  $h$  is in feet.
5. The topographic effect factor  $K_{zt} = 1.0$  or the wind pressures determined from this section shall be multiplied by  $K_{zt}$  at each height  $z$  as determined from Section 26.8. It shall be permitted to use one value of  $K_{zt}$  for the building calculated at  $0.33h$ . Alternatively it shall be permitted to enter the pressure table with a wind velocity equal to  $V\sqrt{K_{zt}}$  where  $K_{zt}$  is determined at a height of  $0.33h$ .

#### 27.5.3 Wind Load Parameters Specified in Chapter 26

Refer to Chapter 26 for determination of Basic Wind Speed  $V$  (Section 26.5) and exposure category (Section 26.7) and topographic factor  $K_{zt}$  (Section 26.8).

#### 27.5.4 Diaphragm Flexibility

The design procedure specified herein applies to buildings having either rigid or flexible diaphragms. The structural analysis shall consider the relative