This flow chart presents the comprehensive determination of wind loads for a single-storey (industrial) building in a simplified way.

Start

Calculate basic wind velocity

\[ V_b = C_{df} \times C_{season} \times V_{3.0} \]

Recommended value for \( C_{df} \) and \( C_{season} \) is 1.0

Basic data

EN 1991-1-4
§ 4.5

Determine peak velocity pressure

\[ q_p(z) \]

Determine structural factor

\[ C_a, C_d \]

Usually \( C_a \) and \( C_d \) are taken equal to 1.0

EN 1991-1-4
section 6

Determine external pressure coefficients

\[ C_{pxi} \]

\[ i = A \text{ to } J \]

EN 1991-1-4
§ 7.1 - 7.2.8

Determine internal pressure coefficients

\[ C_{pi} \]

EN 1991-1-4
§ 7.2.9

Determine wind pressure

\[ w_i = q_p(z_i) \times C_{pi} \text{ [kN/m]}^2 \]

\[ w_i = q_p(z_i) \times C_{pi} \text{ [kN/m]}^2 \]

Determine wind forces

\[ F_{ax} = C_a C_x \times \sum w_i A_{i,s} \]

\[ F_{ax} = \sum w_i A_{i,s} \]

\[ F_{bi} = C_b q_p(z_i) A_{bi} \]

EN 1991-1-4
§ 5.3 (3)

EN 1991-1-4
§ 7.5 (3)-(4)

Basic data

\[ b, h, d \]

Stop
Determination of peak velocity pressure

Start

Calculate h/b ratio

\[ h \leq b \]

Building may be considered to be one part

Determine input values
\( c(z), c_0(z), k_i, z_0 \)

EN 1991-1-4 § 4.3.2
Determine roughness factor \( c(z) \)

EN 1991-1-4 § 4.3.3
Determine orography factor \( c_0(z) \)

EN 1991-1-4
Determine turbulence factor \( k_i \)

National Annex
Determine roughness length \( z_0 \)

EN 1991-1-4 Table 4.1

\( c(z), c_0(z), k_i, z_0 \)

Calculate mean velocity wind
\[ v_m(z) = c(z) \times c_0(z) \times v_u \]

EN 1991-1-4 § 4.3 eq. (4.3)

Calculate turbulence intensity
\[ I_v(z) = \frac{k_i}{c_n(z) \times \ln(z / z_0)} \]

where \( z = \min (z, z_{\text{min}}) \)

EN 1991-1-4 § 4.4 eq. (4.7)

Calculate peak velocity pressure
\[ q_p(z) = [1 + 7I_v(z)] \times \frac{1}{2} \rho \times v_m^2(z) \]

EN 1991-1-4 §4.5 eq. (4.8)

Return
Determination of external pressure coefficients

Start

Determine loaded area A [m²]

A > 10 m²

\[ c_{pe} = c_{pe,10} \]

1 < A < 10 m²

\[ c_{pe} = c_{pe,1} - \left( \frac{c_{pe,1} - c_{pe,10}}{\log_{10} A} \right) \]

1 > A

\[ c_{pe} = c_{pe,1} \]

Diegetic for single-storey buildings

EN 1991-1-4 § 7.2.2

Divide walls into zones A, B, C, D & E

\[ e = \min (b, 2h) \]
\[ b \text{ crosswind dimension} \]

\[ e < d \]

\[ e \geq d \]

\[ e \geq 5d \]

\[ c_{pe,1} \]

EN 1991-1-4 Table 7.1

Determine recommended values \( c_{pe} \) for external pressure coefficients for vertical walls of rectangular plan buildings

Flow Chart: Evaluation of wind loads (single-storey buildings)

SF014a-EN-EU

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Determination of external pressure coefficients

1. Determine roof type and divide roof into zones F, G, H, I, J
2. For flat roof (\(-5^\circ < \alpha < 5^\circ\)), refer to Table 7.2
   (EN 1991-1-4)
3. For monopitch roof, refer to Table 7.3a, 7.4a, 7.4b
4. For duopitch roof, refer to Table 7.3a, 7.4a, 7.4b
5. For multispans, refer to Table 7.3a, 7.4a, 7.4b
6. Determine external pressure coefficients \(C_{om}\) for roofs
7. \(e = \min(b, 2h)\) where \(b\) is the crosswind dimension

Return
Determination of pressure coefficients (internal surfaces $\omega_i$)

1. Start
2. Calculate opening ratio $\mu$:
   \[ \mu = \frac{\sum \text{area of openings where } c_{\omega} \text{ is negative or } -0.0}{\sum \text{area of all openings}} \]
   
   **Note:** Where it is not possible to estimate $\mu$, then $c_{\omega}$ should be taken as the more onerous of $+0.2$ and $-0.3$

3. Determine internal pressure coefficient $c_{\omega}$
4. Return
# Quality Record

**RESOURCE Title**
Flow Chart: Evaluation of wind loads (single-storey buildings)

**Reference(s)**

**ORIGINAL DOCUMENT**

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