WIND LOADS CALCULATION PER BS 6399-2

FOR A BASIC WIND SPEED OF 25 m/s

\[ V_b := 25 \frac{m}{s} \]

- basic wind speed

\[ K_b := 1 \]

- building type factor in accordance with BS 6399-2 Table 1.
  - for ramed building with structural walls arround lifts and stairs only (e.g. office buildings of open plan or without partitions)

\[ H_r := 30 \ m \]

- Reference height

\[ H_e := H_r \]

- Effective height to be considered in the calculations

Basic wind speed calculation in accordance with BS 6399-2 Section 2.2.1

\[ \Delta S := 100 \]

- site altitude above sea level in meters - Section 2.2.2.2

\[ S_a := 1 + 0.001 \cdot \Delta S \]

- altitude factor

\[ S_a = 1.1 \]

\[ S_d := 1 \]

- direction factor - Section 2.2.2.3 for unknown wind direction

\[ S_s := 1 \]

- seasonal factor - Section 2.2.2.4

\[ S_p := 1 \]

- probability factor - Section 2.2.2.5

\[ V_s := V_b \cdot S_a \cdot S_d \cdot S_s \cdot S_p \]

\[ V_s = 27.5 \frac{m}{s} \]

Effective wind speed calculation in accordance with BS 6399-2 Section 2.2.3

\[ S_b := 1.96 \]

- terrain and building factor - Section 2.2.3.3 - Table 4

\[ V_e := V_s \cdot S_b \]

\[ V_e = 53.9 \frac{m}{s} \]

- effective wind speed

for building heights larger that the width some reduction in wind loads may be obtained by dividing the building into a number of parts - in our case the reduction is neglijable.

\[ L := 51 \ m \]

- building length

\[ W := 25 \]

- building width
\[
\frac{L}{H_e} = 1.7
\]

*external pressure coeff. - longitudinal per BS 6399-2 - Table 5*

Longitudinal coefficients

\[
C_{pe.\text{winward}.L} := 0.749
\]

interpolation - values in Table 5

\[
C_{pe.\text{leeward}.L} := -0.249
\]

\[
\frac{W}{H_e} = 0.833 \frac{1}{m}
\]

*external pressure coeff. - transversal per BS 6399-2 - Table 5*

Transversal coefficients

\[
C_{pe.\text{winward}.T} := 0.800
\]

values in Table 5

\[
C_{pe.\text{leeward}.T} := -0.300
\]

\[
C_{a.L} := 0.848
\]

in accordance with BS 6399-2 Figure 4

\[
C_{a.T} := 0.816
\]

Dynamic pressure per BS 6399-2 Section 2.1.2

\[
q_s := 0.613 \left( \frac{V_e}{m} \right)^2 \cdot Pa
\]

in accordance with BS 6399-2 Formula 1

\[
q_s = \left( 1.781 \cdot 10^3 \right) \cdot Pa
\]

\[
P_{e.\text{winward}.L} := q_s \cdot C_{pe.\text{winward}.L} \cdot C_{a.L}
\]

in accordance with BS 6399-2 Formula 2

\[
P_{e.\text{winward}.L} = 1.131 \ kPa
\]

\[
P_{e.\text{leeward}.L} := q_s \cdot C_{pe.\text{leeward}.L} \cdot C_{a.L}
\]

in accordance with BS 6399-2 Formula 2

\[
P_{e.\text{leeward}.L} = -0.376 \ kPa
\]
\[ p_{e,\text{winward}.T} := q_s \cdot C_{pe,\text{winward}.T} \cdot C_{a,T} \quad \text{in accordance with BS 6399-2 Formula 2} \]

\[ p_{e,\text{winward}.T} = 1.163 \ \text{kPa} \]

\[ p_{e,\text{leeward}.T} := q_s \cdot C_{pe,\text{leeward}.T} \cdot C_{a,T} \quad \text{in accordance with BS 6399-2 Formula 2} \]

\[ p_{e,\text{leeward}.T} = -0.436 \ \text{kPa} \]