

Company: Company

Project: IE HECTOR MANUEL VIDES BALLESTEROS (MÓDULO 8)

File: C:\IE REGIDOR\MOD8.rcb

Engineer: Name

10:17:02 a. m. 27/06/2025

WIND LOADS NSR-10

Wind pressure

$$p = q G C_p \text{ rigid buildings}$$

$$= q G_f C_p \text{ flexible buildings}$$

$$q_z = 0.00483 K_z K_{zt} K_d V^2 I \text{ (Kg/m}^2\text{); } V \text{ in Km/h}$$

WIND LOADING PARAMETERS

Basic wind speed (Km/h), V = 125

V: 3-second gust speed at 10 m, with annual probability of 0.002

Importance factor, I = 1.15

OCCUPANCY CATEGORY	IMPORTANCE (1)	F A C T O R (2)
I Normal occupancy buildings	0.87	0.77
II Especial occupancy buildings	1.00	1.00
III Public assistance facilities	1.15	1.15
IV Essential facilities	1.15	1.15
(1): Non-hurricane prone regions with V=140-160 km/h		
(2): Hurricane prone regions with V >160 Km/h		

Exposure category = C

ROUGHNESS	DESCRIPTION
B	Urban and suburban areas, wooded areas, obstructions >30ft
C	Open terrain with scattered obstructions less than 30 ft
D	Flat, unobstructed areas, wind over large bodies of water

Directionality factor, K_d = 0.85Topographic factor, K_{zt} = 1.0

$$K_{zt} = (1 + K_1 K_2 K_3)^2$$

Wall pressure coefficients, C_p

Windward wall	 = 0.8
Leeward wall (Wind X)	 = -0.423
Leeward wall (Wind Y)	 = -0.5
Side walls	 = -0.7
Roof	 = 0.0

GUST EFFECTS FACTORS

Basic wind velocity, (Km/h) = 125

Exposure category = C

Exposed height, (m) = 3.65

	X-direction	Y-direction	
Computed natural frequency, f (Hz) =	4.785	4.695	
Height / Length ratio, H/L =	.314	.434	
Structure clasification =	RIGID	RIGID	
Background response index, Q =	.927	.917	(Eq. B.6.5-4)
Resonant response factor, R ₁ *.... =	.117	.103	(Eq. B.6.5-8)
Gh: Rigid - Simplified analysis .. =	.85	.85	(Sec B.6.5.8.1)
Gh: Rigid - Complete analysis =	.883	.878	(Eq. B.6.5-2)
Gf: Flexible -Analytical(2% dampng)=	1.063	1.055	(Eq. B.6.5-6)
Gf: Flexible -Analytical(1% dampng)=	1.065	1.056	(Eq. B.6.5-6)

Gust effects factor, G = .883 .878

* 1% damping ratio. For damping ratio β , $R = R_1 * (0.01/\beta)^{1/2}$

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V E L O C I T Y P R E S S U R E		
Floor	Height	Pressure
-	z, m	qz, K/m2
-----	-----	-----
2	3.65	63.297
1	0.0	63.297

A C C I D E N T A L T O R S I O N F O R W I N D L O A D S		
	X-direction	Y-direction
	-----	-----
Accidental eccentricity as a percentage of building dimension, (%)=	15	15
WY is Envelope of:	WX is Envelope of:	
Case 1: Pwy + Ply	Case 1: Pwx + Plx	
Case 2: 0.75 (Pwy + Ply) + Mt	Case 2: 0.75 (Pwx + Plx) + Mt	
Mt=0.75(Pwy+Ply)Bx ex	Mt=0.75 (Pwx+Plx)By ey	
NOTE: Load cases 3 and 4 are handled through load combinations		

A C C I D E N T A L E C C E N T R I C I T Y W I N D L O A D S		
	X-DIRECTION (WY)	Y-DIRECTION (WX)
	-----	-----
Level	ex	ey
-	(m)	(m)
-----	-----	-----
2	1.75	1.26
WY is Envelope of:		
Case 1: Pwy + Ply	Case 1: Pwx + Plx	
Case 2: 0.75 (Pwy + Ply) + Mt	Case 2: 0.75 (Pwx + Plx) + Mt	
Mt=0.75(Pwy+Ply)Bx ex	Mt=0.75 (Pwx+Plx)By ey	
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Wind nodal forces:

$P_w = \sum p_z A_i$

$P_s = \sum p_h A_i$

$A_i = \text{Nodal tributary area}$

$P_l = \sum p_h A_i$

$P_r = \sum p_h A_i$

W I N D F O R C E S : X - D I R E C T I O N					
Floor No	Height z, m	Windward Pw, Ton	Leeward Pl, Ton	Side Ps, Ton	Roof Pr, Ton
2	3.65	0.69	0.36	0.83	0.0
1	0.0	0.0	0.0	0.58	0.0

Base shear, $V:\sum(P_w+P_l) \dots = 1.04 \text{ ton}$

Building Weight, $W \dots = 52.84 \text{ ton} \quad (V/W = 0.020)$

Overturning moment

From horizontal forces $\dots = 3.82 \text{ ton-m}$

From roof forces $\dots = 0.0 \text{ ton-m}$

Total moment, $M_o \dots = 3.82 \text{ ton-m}$

Stabilizing moment, $M_s \dots = 179.94 \text{ ton-m} \quad (M_o/M_s = 0.021)$

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Wind nodal forces:

$P_w = \sum p_z A_i$

$P_s = \sum p_h A_i$

$A_i = \text{Nodal tributary area}$

$P_l = \sum p_h A_i$

$P_r = \sum p_h A_i$

W I N D F O R C E S : Y - D I R E C T I O N					
Floor No	Height z, m	Windward Pw, Ton	Leeward Pl, Ton	Side Ps, Ton	Roof Pr, Ton
2	3.65	0.94	0.58	0.60	0.0
1	0.0	0.66	0.41	0.0	0.0

Base shear, $V:\sum(P_w+P_l) \dots = 2.59 \text{ ton}$

Building Weight, $W \dots = 52.84 \text{ ton} \quad (V/W = 0.049)$

Overturning moment

From horizontal forces $\dots = 5.59 \text{ ton-m}$

From roof forces $\dots = 0.0 \text{ ton-m}$

Total moment, $M_o \dots = 5.59 \text{ ton-m}$

Stabilizing moment, $M_s \dots = 222.22 \text{ ton-m} \quad (M_o/M_s = 0.025)$