

Company: Company

Project: IE HECTOR MANUEL VIDES BALLESTEROS (MÓDULO 6)

File: C:\IE REGIDOR\MOD6.rcb

Engineer: Name

9:48:00 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)	 = -0.474
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) = 6.2

	X-direction -----	Y-direction -----	
Computed natural frequency, f (Hz) =	3.356	5.435	
Height / Length ratio, H/L =	.253	.285	
Structure clasification =	RIGID	RIGID	
Background response index, Q =	.885	.879	(Eq. B.6.5-4)
Resonant response factor, R ₁ *.... =	.091	.046	(Eq. B.6.5-8)
Gh: Rigid - Simplified analysis .. =	.85	.85	(Sec B.6.5.8.1)
Gh: Rigid - Complete analysis =	.859	.856	(Eq. B.6.5-2)
Gf: Flexible -Analytical(2% dampng)=	1.019	1.029	(Eq. B.6.5-6)
Gf: Flexible -Analytical(1% dampng)=	1.02	1.03	(Eq. B.6.5-6)

Gust effects factor, G = .859 .856

* 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 z, m	Pressure qz, K/m2
-----	-----	-----
3	6.19	67.488
2	4.00	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: $P_{wy} + P_{ly}$ Case 1: $P_{wx} + P_{lx}$
Case 2: $0.75 (P_{wy} + P_{ly}) + Mt$ Case 2: $0.75 (P_{wx} + P_{lx}) + Mt$
 $Mt=0.75(P_{wy}+P_{ly})B_x ex$ $Mt=0.75(P_{wx}+P_{lx})B_y ey$
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)
-----	-----	-----
3	2.05	2.95
2	3.68	3.26

WY is Envelope of: WX is Envelope of:
Case 1: $P_{wy} + P_{ly}$ Case 1: $P_{wx} + P_{lx}$
Case 2: $0.75 (P_{wy} + P_{ly}) + Mt$ Case 2: $0.75 (P_{wx} + P_{lx}) + Mt$
 $Mt=0.75(P_{wy}+P_{ly})B_x ex$ $Mt=0.75(P_{wx}+P_{lx})B_y ey$
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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
3	6.19	1.00	0.58	0.61	0.0
2	4.00	2.93	1.85	3.08	0.0
1	0.0	0.23	0.15	0.0	0.0

Base shear, $V:\sum(P_w+P_l) \dots = 6.76 \text{ ton}$

Building Weight, $W \dots\dots = 307.82 \text{ ton} \quad (V/W = 0.022)$

Overturning moment

From horizontal forces $\dots = 29.04 \text{ ton-m}$

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

Total moment, $M_o \dots\dots = 29.04 \text{ ton-m}$

Stabilizing moment, $M_s \dots\dots = 3731.30 \text{ ton-m} \quad (M_o/M_s = 0.008)$

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$P_r = \sum p_h A_i$

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
3	6.19	0.70	0.43	0.88	0.0
2	4.00	3.29	2.20	2.72	0.0
1	0.0	0.0	0.0	0.22	0.0

Base shear, $V:\sum(P_w+P_l) \dots = 6.63 \text{ ton}$
Building Weight, $W \dots \dots = 307.82 \text{ ton} \quad (V/W = 0.022)$
Overturning moment
 From horizontal forces $\dots = 28.98 \text{ ton-m}$
 From roof forces $\dots \dots = 0.0 \text{ ton-m}$
 Total moment, $M_o \dots \dots = 28.98 \text{ ton-m}$
Stabilizing moment, $M_s \dots \dots = 3572.02 \text{ ton-m} \quad (M_o/M_s = 0.008)$