

WIND LOADS AS PER IS 875 (Part 3):2015

BUILDING DIMENSIONS:

Length, l = 150.00 m; Width, w = 100.00 m; Eaves height, h1 = 12.50 m
 h/w = 0.13; l/w = 1.50
 Roof angle, a = 5.71 degrees; Ridge height, h = 17.50 m
 Max spg. of main frame cols. = 7.50 m
 Max spg. of wind cols. = 6.50 m

WIND DATA:

Basic wind speed, Vb = 44 m/s ... (Fig. 1)
 Design life of structure: 50 years
 Terrain category: 2; Building category: Industrial
 Upwind slope, $\theta < 3$ degrees; Permeability: Medium (Cpi = +/- 0.5)
 Building ht. at eaves lvl. (z) = 12.50 m
 k1 (Risk coefficient) = 1.00 ... (Table-1)
 k3 (Topography factor) = 1.00 ... (Cl. 6.3.3.1)
 k4 (Importance factor) = 1.15 ... (Cl. 6.3.4)

COLUMN & RAFTER:

k2 (Terrain roughness & ht. factor) = 1.02 ... (Table-2)
 Design wind speed at ht. z, Vz = Vb.k1.k2.k3.k4 = 51.9 m/s ... (Cl. 6.3)
 Wind pressure at ht. z, pz = 0.6 Vz² = 1.614 kN/sq.m ... (Cl. 7.2)
 Wind directionality factor, Kd = 0.90 ... (Cl. 7.2.1)
 Area averaging factor, ka (Table 4):
 Ka,column = 0.90; Ka,rafter = 0.80
 Combination factor, Kc = 0.90 ... (Cl. 7.3.3.13)
 Design wind pressure, pd (Cl. 7.2):
 pd,column = Kd x Ka,column x Kc x pz = 1.18
 pd,rafter = Kd x Ka,rafter x Kc x pz = 1.13


CANOPY (TABLE 21):

Location: Side-A; Height, h2 = 5.00 m
 h1/ h2 = 2.50 > 1.8; Hence, Cpe (a/s) = 0.4 (h1/ h2) - 0.6 = 0.40 ... (Cl. 7.3.3.9)
 Canopy slopes up => hence Cpe (u/s) = 0.75 ... (Cl. 7.3.3.5)
 Ka,canopy = 0.90 ... (Table 4)
 pd,canopy = Kd x Ka,canopy x Kc x pz = 1.18

ROOF MONITOR:

Ka,monitor (column) = 1.00; Ka,monitor (roof) = 1.00
 pd,monitor (column) = Kd x Ka,monitor (column) x Kc x pz = 1.31
 pd,monitor (roof) = Kd x Ka,monitor (roof) x Kc x pz = 1.31

Values of Cpe, Cpi, Cp,net and UDL are given in tabular form in the tables that follow.


	Client:					Element:
	Project:		Doc. No.:			Location/ Grids:
	Rev.	Ppd. by	Date	Chd. by	Date	
	Project:	2				Designation:
Structure:	1					
Type:	0				Sht. of	

WIND PRESSURE VALUES FOR LOAD CASE (WL+X)

UDL ID	WL+XP					WL+XS				
	Cpe	Cpi (+ve)	Cp,net	UDL (kN/m)	Dirn.	Cpe	Cpi (-ve)	Cp,net	UDL (kN/m)	Dirn.
w1	0.700	0.50	0.200	1.76	GX	0.700	-0.50	1.200	10.59	GX
w2	0.700	0.50	0.200	0.88	GX	0.700	-0.50	1.200	5.29	GX
w3	0.700	0.50	0.200	1.76	GX	0.700	-0.50	1.200	10.59	GX
w4	0.700	0.50	0.200	0.88	GX	0.700	-0.50	1.200	5.29	GX
w5	-0.200	0.50	-0.700	6.18	GX	-0.200	-0.50	0.300	-2.65	GX
w6	-0.200	0.50	-0.700	3.09	GX	-0.200	-0.50	0.300	-1.32	GX
w7	-	-	-	-	-	-	-	-	-	-
w8	-	-	-	-	-	-	-	-	-	-
w9	-0.500	0.50	-1.000	-7.65	GZ	-0.500	-0.50	0.000	0.00	GZ
w10	-0.500	0.50	-1.000	-3.82	GZ	-0.500	-0.50	0.000	0.00	GZ
w11	-0.500	0.50	-1.000	7.65	GZ	-0.500	-0.50	0.000	0.00	GZ
w12	-0.500	0.50	-1.000	3.82	GZ	-0.500	-0.50	0.000	0.00	GZ
w13	-0.600	0.50	-1.100	9.32	LY	-0.600	-0.50	-0.100	0.85	LY
w14	-0.600	0.50	-1.100	4.66	LY	-0.600	-0.50	-0.100	0.42	LY
w15	-0.500	0.50	-1.000	8.47	LY	-0.500	-0.50	0.000	0.00	LY
w16	-0.500	0.50	-1.000	4.24	LY	-0.500	-0.50	0.000	0.00	LY
w17	-0.350	0.00	-0.350	3.09	LY	-0.350	0.00	-0.350	3.09	LY
w18	-0.350	0.00	-0.350	1.54	LY	-0.350	0.00	-0.350	1.54	LY
w19	-	-	-	-	-	-	-	-	-	-
w20	-	-	-	-	-	-	-	-	-	-
w21	0.700	0.50	0.200	1.96	GX	0.700	-0.50	1.200	11.77	GX
w22	-0.600	0.50	-1.100	10.79	GX	-0.600	-0.50	-0.100	0.98	GX
w23	-0.800	0.50	-1.300	12.75	LY	-0.800	-0.50	-0.300	2.94	LY
w24	0.700	0.50	0.200	0.98	GX	0.700	-0.50	1.200	5.88	GX
w25	-0.600	0.50	-1.100	5.39	GX	-0.600	-0.50	-0.100	0.49	GX
w26	-0.800	0.50	-1.300	6.37	LY	-0.800	-0.50	-0.300	1.47	LY

LEGEND/ SIGN CONVENTION:

- (a) WL+XP: 'WL' indicates Wind Load, '+XP' indicates +ve X dirn. with pressure (+ve) inside the building.
- (b) WL+XS: 'WL' indicates Wind Load, '+XS' indicates +ve X-dirn. with suction (-ve) inside the building.
- (c) UDL: Uniformly distributed load acting on the structural element as a result of the wind pressure.
- (d) 'Cpe' and 'Cpi' values follow the sign convention given in IS 875-2015 (Part3), namely, towards the roof/wall/canopy/monitor as +ve and away from the element as -ve.
- (e) 'GX' & 'GZ' values correspond to building reference axes shown in 'Notation' Sheet, while 'LY' is member local Y-axis viz. normal to slope outwards.

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Project:	2					
Structure:	1					
Type:	0					Sht. of

WIND PRESSURE VALUES FOR LOAD CASE (WL-X)

UDL ID	WL-XP					WL-XS				
	Cpe	Cpi (+ve)	Cp,net	UDL (kN/m)	Dirn.	Cpe	Cpi (-ve)	Cp,net	UDL (kN/m)	Dirn.
w1	-0.200	0.50	-0.700	-6.18	GX	-0.200	-0.50	0.300	2.65	GX
w2	-0.200	0.50	-0.700	-3.09	GX	-0.200	-0.50	0.300	1.32	GX
w3	-0.400	0.50	-0.900	-7.94	GX	-0.400	-0.50	0.100	0.88	GX
w4	-0.400	0.50	-0.900	-3.97	GX	-0.400	-0.50	0.100	0.44	GX
w5	0.700	0.50	0.200	-1.76	GX	0.700	-0.50	1.200	-10.59	GX
w6	0.700	0.50	0.200	-0.88	GX	0.700	-0.50	1.200	-5.29	GX
w7	-	-	-	-	-	-	-	-	-	-
w8	-	-	-	-	-	-	-	-	-	-
w9	-0.500	0.50	-1.000	-7.65	GZ	-0.500	-0.50	0.000	0.00	GZ
w10	-0.500	0.50	-1.000	-3.82	GZ	-0.500	-0.50	0.000	0.00	GZ
w11	-0.500	0.50	-1.000	7.65	GZ	-0.500	-0.50	0.000	0.00	GZ
w12	-0.500	0.50	-1.000	3.82	GZ	-0.500	-0.50	0.000	0.00	GZ
w13	-0.500	0.50	-1.000	8.47	LY	-0.500	-0.50	0.000	0.00	LY
w14	-0.500	0.50	-1.000	4.24	LY	-0.500	-0.50	0.000	0.00	LY
w15	-0.600	0.50	-1.100	9.32	LY	-0.600	-0.50	-0.100	0.85	LY
w16	-0.600	0.50	-1.100	4.66	LY	-0.600	-0.50	-0.100	0.42	LY
w17	-0.300	0.00	-0.300	2.65	LY	-0.300	0.00	-0.300	2.65	LY
w18	-0.300	0.00	-0.300	1.32	LY	-0.300	0.00	-0.300	1.32	LY
w19	-	-	-	-	-	-	-	-	-	-
w20	-	-	-	-	-	-	-	-	-	-
w21	-0.600	0.50	-1.100	-10.79	GX	-0.600	-0.50	-0.100	-0.98	GX
w22	0.700	0.50	0.200	-1.96	GX	0.700	-0.50	1.200	-11.77	GX
w23	-0.800	0.50	-1.300	12.75	LY	-0.800	-0.50	-0.300	2.94	LY
w24	-0.600	0.50	-1.100	-5.39	GX	-0.600	-0.50	-0.100	-0.49	GX
w25	0.700	0.50	0.200	-0.98	GX	0.700	-0.50	1.200	-5.88	GX
w26	-0.800	0.50	-1.300	6.37	LY	-0.800	-0.50	-0.300	1.47	LY

LEGEND/ SIGN CONVENTION:

- (a) WL-XP: 'WL' indicates Wind Load, '-XP' indicates -ve X dirn. with pressure (+ve) inside the building.
- (b) WL-XS: 'WL' indicates Wind Load, '-XS' indicates -ve X-dirn. with suction (-ve) inside the building.
- (c) UDL: Uniformly distributed load acting on the structural element as a result of the wind pressure.
- (d) 'Cpe' and 'Cpi' values follow the sign convention given in IS 875-2015 (Part3), namely, towards the roof/wall/canopy/monitor as +ve and away from the element as -ve.
- (e) 'GX' & 'GZ' values correspond to building reference axes shown in 'Notation' Sheet, while 'LY' is member local Y-axis viz. normal to slope outwards.



Client:


Project:		Doc. No.:		Element:	
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2					Designation:
Structure:	1				Sht. of
Type:	0				

WIND PRESSURE VALUES FOR LOAD CASE (WL+Z)

UDL ID	WL+ZP					WL+ZS				
	Cpe	Cpi (+ve)	Cp,net	UDL (kN/m)	Dirn.	Cpe	Cpi (-ve)	Cp,net	UDL (kN/m)	Dirn.
w1	-0.500	0.50	-1.000	-8.82	GX	-0.500	-0.50	0.000	0.00	GX
w2	-0.500	0.50	-1.000	-4.41	GX	-0.500	-0.50	0.000	0.00	GX
w3	-0.500	0.50	-1.000	-8.82	GX	-0.500	-0.50	0.000	0.00	GX
w4	-0.500	0.50	-1.000	-4.41	GX	-0.500	-0.50	0.000	0.00	GX
w5	-0.500	0.50	-1.000	8.82	GX	-0.500	-0.50	0.000	0.00	GX
w6	-0.500	0.50	-1.000	4.41	GX	-0.500	-0.50	0.000	0.00	GX
w7	-	-	-	-	-	-	-	-	-	-
w8	-	-	-	-	-	-	-	-	-	-
w9	0.700	0.50	0.200	1.53	GZ	0.700	-0.50	1.200	9.18	GZ
w10	0.700	0.50	0.200	0.76	GZ	0.700	-0.50	1.200	4.59	GZ
w11	-0.200	0.50	-0.700	5.35	GZ	-0.200	-0.50	0.300	-2.29	GZ
w12	-0.200	0.50	-0.700	2.68	GZ	-0.200	-0.50	0.300	-1.15	GZ
w13	-0.428	0.50	-0.928	7.87	LY	-0.428	-0.50	0.072	-0.61	LY
w14	-0.800	0.50	-1.300	5.51	LY	-0.800	-0.50	-0.300	1.27	LY
w15	-0.428	0.50	-0.928	7.87	LY	-0.428	-0.50	0.072	-0.61	LY
w16	-0.800	0.50	-1.300	5.51	LY	-0.800	-0.50	-0.300	1.27	LY
w17	-0.500	0.00	-0.500	4.41	LY	-0.500	0.00	-0.500	4.41	LY
w18	-0.500	0.00	-0.500	2.21	LY	-0.500	0.00	-0.500	2.21	LY
w19	-	-	-	-	-	-	-	-	-	-
w20	-	-	-	-	-	-	-	-	-	-
w21	-0.500	0.50	-1.000	-9.80	GX	-0.500	-0.50	0.000	0.00	GX
w22	-0.500	0.50	-1.000	9.80	GX	-0.500	-0.50	0.000	0.00	GX
w23	-0.800	0.50	-1.300	12.75	LY	-0.800	-0.50	-0.300	2.94	LY
w24	-0.500	0.50	-1.000	-4.90	GX	-0.500	-0.50	0.000	0.00	GX
w25	-0.500	0.50	-1.000	4.90	GX	-0.500	-0.50	0.000	0.00	GX
w26	-0.800	0.50	-1.300	6.37	LY	-0.800	-0.50	-0.300	1.47	LY

LEGEND/ SIGN CONVENTION:

- (a) WL+ZP: 'WL' indicates Wind Load, '+ZP' indicates +ve Z dirn. with pressure (+ve) inside the building.
- (b) WL+ZS: 'WL' indicates Wind Load, '+ZS' indicates +ve Z-dirn. with suction (-ve) inside the building.
- (c) UDL: Uniformly distributed load acting on the structural element as a result of the wind pressure.
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Project:	2					Designation:
Structure:	1					
Type:	0					Sht. of

WIND PRESSURE VALUES FOR LOAD CASE (WL-Z)

UDL ID	WL-ZP					WL-ZS				
	Cpe	Cpi (+ve)	Cp,net	UDL (kN/m)	Dirn.	Cpe	Cpi (-ve)	Cp,net	UDL (kN/m)	Dirn.
w1	-0.500	0.50	-1.000	-8.82	GX	-0.500	-0.50	0.000	0.00	GX
w2	-0.500	0.50	-1.000	-4.41	GX	-0.500	-0.50	0.000	0.00	GX
w3	-0.500	0.50	-1.000	-8.82	GX	-0.500	-0.50	0.000	0.00	GX
w4	-0.500	0.50	-1.000	-4.41	GX	-0.500	-0.50	0.000	0.00	GX
w5	-0.500	0.50	-1.000	8.82	GX	-0.500	-0.50	0.000	0.00	GX
w6	-0.500	0.50	-1.000	4.41	GX	-0.500	-0.50	0.000	0.00	GX
w7	-	-	-	-	-	-	-	-	-	-
w8	-	-	-	-	-	-	-	-	-	-
w9	-0.200	0.50	-0.700	-5.35	GZ	-0.200	-0.50	0.300	2.29	GZ
w10	-0.200	0.50	-0.700	-2.68	GZ	-0.200	-0.50	0.300	1.15	GZ
w11	0.700	0.50	0.200	-1.53	GZ	0.700	-0.50	1.200	-9.18	GZ
w12	0.700	0.50	0.200	-0.76	GZ	0.700	-0.50	1.200	-4.59	GZ
w13	-0.428	0.50	-0.928	7.87	LY	-0.428	-0.50	0.072	-0.61	LY
w14	-0.800	0.50	-1.300	5.51	LY	-0.800	-0.50	-0.300	1.27	LY
w15	-0.428	0.50	-0.928	7.87	LY	-0.428	-0.50	0.072	-0.61	LY
w16	-0.800	0.50	-1.300	5.51	LY	-0.800	-0.50	-0.300	1.27	LY
w17	-0.500	0.00	-0.500	4.41	LY	-0.500	0.00	-0.500	4.41	LY
w18	-0.500	0.00	-0.500	2.21	LY	-0.500	0.00	-0.500	2.21	LY
w19	-	-	-	-	-	-	-	-	-	-
w20	-	-	-	-	-	-	-	-	-	-
w21	-0.500	0.50	-1.000	-9.80	GX	-0.500	-0.50	0.000	0.00	GX
w22	-0.500	0.50	-1.000	9.80	GX	-0.500	-0.50	0.000	0.00	GX
w23	-0.800	0.50	-1.300	12.75	LY	-0.800	-0.50	-0.300	2.94	LY
w24	-0.500	0.50	-1.000	-4.90	GX	-0.500	-0.50	0.000	0.00	GX
w25	-0.500	0.50	-1.000	4.90	GX	-0.500	-0.50	0.000	0.00	GX
w26	-0.800	0.50	-1.300	6.37	LY	-0.800	-0.50	-0.300	1.47	LY

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Structure:	1			
Type:	0			

Designation:

Sht. of