

MecaWind v2390

Software Developer: Meca Enterprises Inc., www.meca.biz, Copyright © 2020

Calculations Prepared by:

test
Date: Jul 01, 2021

File Location : M:\Website\Website Content\Tanks\Tank.wnd

Basic Wind Parameters

Wind Load Standard	= ASCE 7-16	Exposure Category	= C
Wind Design Speed	= 53.64 m/s	Risk Category	= II
Structure Type	= Other	Other Structure Type	= Tank

General Wind Settings

Incl_LF	= Include ASD Load Factor of 0.6 in Pressures	= False
DynType	= Dynamic Type of Structure	= Rigid
Zg	= Altitude (Ground Elevation) above Sea Level	= 0.0000 m
Bdist	= Base Elevation of Structure	= 0.0000 m
Reacs	= Show the Base Reactions in the output	= False
MWFRSType	= MWFRS Method Selected	= Ch 29

Topographic Factor per Fig 26.8-1

Topo	= Topographic Feature	= None
Kzt	= Topographic Factor	= 1.000

Building Inputs

Legs : On Legs	= True	C	: Clearance Height	= 1.5240 m	
N	: Number of Legs	= 4	W	: Width of Legs	= 0.3048 m
Rnd	: Round Legs	= False	D	: Outer Diameter	= 3.0480 m
H	: Solid Cylinder Height	= 6.0960 m	ET	: Tank Enclosure Type	= Enclosed
Roof : Roof Type	= Conical	RHt	: Roof Height	= 0.6096 m	
Group: Group of 3 or More	= False				

Exposure Constants per Table 26.11-1:

Alpha: Table 26.11-1 Const	= 9.500	Zg: Table 26.11-1 Const	= 274.3209 m
At: Table 26.11-1 Const	= 0.105	Bt: Table 26.11-1 Const	= 1.000
Am: Table 26.11-1 Const	= 0.154	Bm: Table 26.11-1 Const	= 0.650
C: Table 26.11-1 Const	= 0.200	Eps: Table 26.11-1 Const	= 0.200

Gust Factor Calculation:

Gust Factor Category I Rigid Structures - Simplified Method		
G1	= For Rigid Structures (Nat. Freq.>1 Hz) use 0.85	= 0.85
Gust Factor Category II Rigid Structures - Complete Analysis		
Zm	= 0.6 * Ht	= 4.7549 m
Izm	= Cc * (33 / Zm) ^ 0.167	= 0.227
Lzm	= L * (Zm / 33) ^ Epsilon	= 430.419
Q	= (1 / (1 + 0.63 * ((B + Ht) / Lzm)^0.63))^0.5	= 0.940
G2	= 0.925 * ((1 + 1.7 * lzm * 3.4 * Q) / (1 + 1.7 * 3.4 * lzm))	= 0.893
Gust Factor Used in Analysis		
G	= Lessor Of G1 Or G2	= 0.850

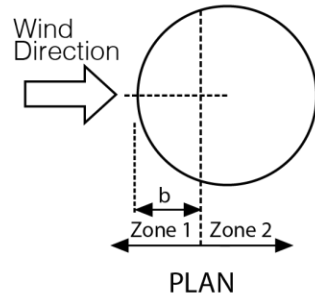
Main Wind Force Resisting System (MWFRS) Calculations for Tank per Ch 29:

LF	= Load Factor based upon STRENGTH Design	= 1.00
hs	= Overall height of structure	= 7.9248 m
h	= Mean Roof Height above grade	= 7.9248 m
Kh	= 15 ft [4.572 m] < Z < Zg --> (2.01 * (Z/zg)^(2/Alpha) {Table 26.10-1})	= 0.953
Kzt	= Topographic Factor is 1 since no Topographic feature specified	= 1.000
Kd	= Wind Directionality Factor per Table 26.6-1	= 1.00
qh	= (0.613 * Kht * Kzt * Kd * Ke * V^2) * LF	= 1.682 kPa

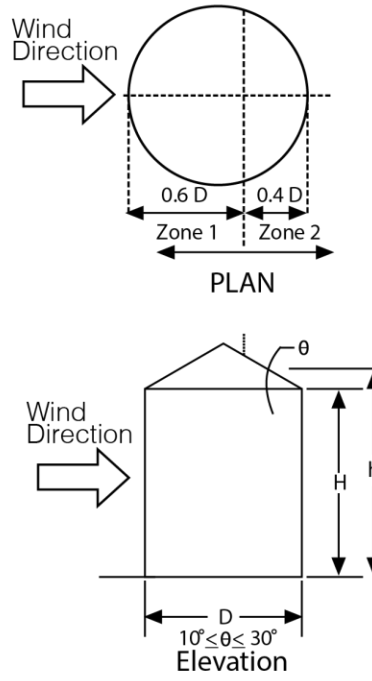
Wind Loads on Tank Per Sec 29.4.2

X is direction of wind and Z is vertical

Flat, Conical, or Dome Roofs



Conical Roofs



h	= Mean Roof Height	= 7.9248 m
GCPi	= Ref Table 26.13-1 for Enclosed Building	= +/-0.18
LF	= Load Factor based upon STRENGTH Design	= 1.00
HD	= Ratio of H / D	= 2.00
Slope	= Slope of roof	= 21.8 Deg

Wind Pressures acting on Roof:

Axy	= Area of Roof or Floor in Horizontal XY plane: $\pi * D^2$	= 7.297 sq m
b	= Width of Zone1 for Conical with Slope > 10 deg: $0.6 * D$	= 1.8288 m
Axy1	= Zone 1 Area of Roof in Horizontal XY plane	= 4.571 sq m
Axy2	= Zone 2 Area of Roof in Horizontal XY plane	= 2.725 sq m
Cp1	= Cp for Zone 1 per 29.4-5	= -0.80
Cp2	= Cp for Zone 2 per 29.4-5	= -0.50
CpFN	= Negative Cp For Floor per Para 29.4.2.3	= -0.45
CpFP	= Positive Cp For Floor per Para 29.4.2.3	= 0.60

Wind Pressures for Roof (+GCPi)
All wind pressures include a load factor of 1.0

Description	Cp	GCPi	Axy sq m	Xc m	p Press kPa	Fz N	My N-m
Roof Zone 1 (+GCPi)	-0.800	0.180	4.571	-0.4856	-1.446	-6612	3210.6
Roof Zone 2 (+GCPi)	-0.500	0.180	2.725	0.8144	-1.018	-2773	-2258.6
Total (+GCPi)			7.297			-9386	952.0

Notes:

- Cp = External Press Coeff
- Axy = Horizontal Cross Sectional Area
- p = Pressure: $q_h * (G * C_p - GCPi)$ [Eqn 29.4-4]
- My = Moment due to Eccentricity: $Fz * Xc$
- + Pressures Acting TOWARD Surface
- GCPi = Positive Internal Press Coeff
- Xc = Dist from Center to Force
- Fz = Vertical Force: $p * Axy$
- Pressures Acting AWAY from Surface

Wind Pressures for Roof (-GCPi)
All wind pressures include a load factor of 1.0

Description	Cp	GCPi	Axy sq m	Xc m	p Press kPa	Fz N	My N-m
Roof Zone 1 (-GCPi)	-0.800	-0.180	4.571	-0.4856	-0.841	-3844	1866.6
Roof Zone 2 (-GCPi)	-0.500	-0.180	2.725	0.8144	-0.412	-1123	-914.6
Total (-GCPi)			7.297			-4967	952.0

