

SELF- SUPPORTING TOWER 24.0M HIGH TO INSTALL AT AMERICAN CONSULATE PREMESIS , CHENNAI.

PROJECT :

To design a self supporting steel tower 24.0 m high to be install in American Consulate Premesis, Chennai.

Soil Report:

Given by Nagadi Consultants Pvt. Ltd. , Chennai. Report No. G©8930

Dt : 17-11-2016.

S.B.C. Taken as 11 t / sq.m. at 1.5 m from E.G.L.

ANALYSIS & DESIGN :

a) I S Codes Reffered:

- i) IS 800 - 2007 , General Construction in Steel – Code of Practice.
- ii) IS 802 -1992, Code of Practice for use of Structural Steel in over head Transmission line Tower.
- iii) IS 456 – 2000 Plain and Reinforced Concrete code of Practice
- iv) IS 875 (Part 1) – 1987 Code of Practice for Design Loads (Other than Earthquake) for Buildings and Structures - Dead Loads-Unit weights of Building Matrerials and Stored Materials
- v) IS 875 (Part 3) – 1987 Code of Practice for Design Loads (Other than Earthquake) for Buildings and Structures - Wind Loads

b) Materials used :

Tata Structura Circular Hollow Sections with YST 310 Grade

- i) 65 Nominal bore X 4.5 thk. with 7.93 kg/ m
- ii) 50 Nominal bore X 4.5 thk. with 6.19 kg/ m
- iii) 40 Nominal bore X 4.0 thk. with 4.37 kg/ m

M S Plates for Base plate, Stiffener plate and cap plate with YST 250 Grade

High Strength Bolts

b) Loads Considered:

- i) Dead Load (DL) - Self Weight of Structure
- ii) Wind Load (WL) as per IS 875 (Part 3)

Basic Wind Speed in Chennai = $V_b = 50$ m /s upto 10M ht. (Appendix A)

Design Wind Speed = $V_z = V_b * k_1 * k_2 * k_3$

Structure is taken as of Class A Category 2 with Mean probable

Design Life of 25 Years.

where k_1 - Risk Coefficient = 0.9 (Table 1)

k_2 - Terrain Height and Structure Size Factor (Table 2)

k_3 - Topography Factor - 1 (Table 3)

Design Wind Pressure (Pz) ;

The design wind speed at any height above mean ground level shall be obtained by the following relationship between wind pressure (Pz) and wind velocity (Vz)

$$Pz = 0.6 * Vz ^ 2 * Cf * E$$

where Vz - Effective wind Velocity

Cf - Force Coefficient = 1.6 (Table 32 of IS 875 part 3 page 47)

E - Solid area / Gross area = 0.175

Design Wind Pressure calculation at different Heights :

DESIGN WIND SPEED (Pz)							
S.No	Height in m	k1	k2	k3	Vz in m/s	Pz in N/ sq.m	Pz in kg/ sq m
1	upto 10 m	0.9	1	1	45	238.14	24.05214
2	15 m	0.9	1.05	1	47.25	262.54935	26.51748435
3	20 m	0.9	1.07	1	48.15	272.646486	27.53729509
4	24 m	0.9	1.12	1	50.4	298.722816	30.17100442

Average Wind Pressure = 27.11157 kg / sq.m
say 27 kg / sq.m

Wind Pressure equal to 27 kg / m² is considered throughout as a conservative approach.

The above loads are applied to the Stadd Model and analysis is done.

Stadd pro input and Out put are also enclosed.