

PLP  
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DATE: 03-28-2014

Computerized Composite FLAGPOLE Engineering and Design  
with Load Calculations Based on Standards Established by  
The National Association of Architectural Metal Manufacturers (NAAMM)  
and

The American Association of State Highway and Transportation Officials (AASHTO)  
6th Edition 2013, using Appendix C-Alternate Method for Wind Pressures.

TABLE 1

GIVEN INFORMATION

Flagpole name.....	60 ESN
Height of pole.....	60 feet
Depth of bury in ground.....	6 feet
Base diameter.....	10.433 inches
Tip diameter.....	4.028 inches
Flag size, hoist x fly.....	0 feet x 0 feet (polyester fabric)
Wind speed.....	150 MPH, gust factor 1.3
Material.....	FGI16, 50 inches wide
Breaking Stress.....	28000 psi
Modulus of Elasticity.....	2500000 psi
Wall Th./Inside Dia. ratio....	.018

TABLE 2

60 ESN  
FLAGPOLE

## BENDING MOMENT, STRESS, &amp; DEFLECTION

POLE HEIGHT feet	OUTSIDE DIAMETER inches	INERTIA MOMENT inch <sup>4</sup>	SECTION MODULUS inch <sup>3</sup>	BENDING MOMENT ft-lbs	STRESS psi	DEFLECTION feet
60.000	4.028	2.025	1.005	0.000	0.000	12.967
59.000	4.306	2.484	1.154	12.390	128.895	12.619
58.000	4.661	3.164	1.358	49.292	435.686	12.272
57.000	5.108	7.055	2.762	110.128	478.444	11.925
56.000	5.335	6.998	2.623	194.690	890.596	11.579
55.000	5.574	8.005	2.872	303.609	1268.408	11.233
54.000	5.783	8.962	3.099	437.929	1695.521	10.888
53.000	5.982	9.941	3.324	598.625	2161.310	10.545
52.000	6.225	14.672	4.714	786.667	2002.648	10.204
51.000	6.364	15.704	4.935	1002.995	2438.691	9.864
50.000	6.483	16.626	5.129	1248.339	2920.535	9.526
49.000	6.589	17.477	5.305	1521.461	3441.568	9.190
48.000	6.689	16.171	4.835	1821.035	4519.614	8.856
47.000	6.794	16.962	4.993	2147.473	5161.033	8.526
46.000	6.908	17.849	5.168	2501.200	5808.120	8.200
45.000	6.998	18.571	5.308	2882.643	6517.420	7.877
44.000	7.118	19.564	5.497	3292.215	7186.885	7.559
43.000	7.217	20.409	5.656	3730.349	7914.674	7.246
42.000	7.339	21.484	5.855	4197.484	8603.365	6.939
41.000	7.436	22.364	6.015	4694.064	9364.416	6.636
40.000	7.548	23.411	6.203	5220.520	10098.941	6.340
39.000	7.731	31.861	8.242	5777.352	8411.261	6.050
38.000	7.842	33.288	8.490	6365.157	8997.146	5.765
37.000	7.856	29.993	7.636	6984.354	10976.437	5.487
36.000	7.965	31.286	7.856	7635.190	11662.793	5.214
35.000	8.048	32.296	8.026	8317.985	12436.856	4.949
34.000	8.154	33.616	8.245	9033.119	13146.462	4.691
33.000	8.298	43.661	10.523	9781.032	11153.561	4.440
32.000	8.390	45.167	10.767	10562.211	11771.783	4.197
31.000	8.442	46.034	10.906	11377.041	12518.348	3.960
30.000	8.514	47.252	11.100	12225.793	13217.277	3.730
29.000	8.565	48.128	11.238	13107.149	13995.645	3.508
28.000	8.720	60.143	13.794	14019.866	12196.171	3.293
27.000	8.740	60.570	13.860	14964.292	12955.642	3.085
26.000	8.863	68.021	15.349	15940.716	12462.293	2.884
25.000	8.909	69.119	15.517	16949.426	13108.097	2.690
24.000	8.987	71.007	15.802	17990.684	13661.922	2.503
23.000	9.135	84.983	18.606	19064.811	12295.931	2.323
22.000	9.164	85.823	18.730	20172.180	12923.646	2.150
21.000	9.224	87.579	18.989	21313.023	13468.356	1.983
20.000	9.348	102.056	21.835	22487.598	12358.789	1.824
19.000	9.373	97.515	20.808	23696.207	13665.821	1.671
18.000	9.509	113.201	23.809	24939.141	12569.455	1.525
17.000	9.552	114.806	24.038	26216.689	13087.544	1.385
16.000	9.636	117.985	24.488	27529.148	13490.048	1.252
15.000	9.768	135.003	27.642	28876.744	12536.112	1.125
14.000	9.809	130.793	26.668	30256.217	13614.688	1.005
13.000	9.922	147.911	29.815	31664.312	12744.418	0.891
12.000	9.993	151.254	30.272	33101.355	13121.569	0.784
11.000	10.017	152.395	30.427	34567.559	13632.818	0.683
10.000	10.131	164.376	32.450	36063.039	13336.077	0.588

9.000	10.148	165.243	32.567	37587.973	13850.248	0.500
8.000	10.309	187.060	36.291	39142.617	12943.070	0.418
7.000	10.344	189.067	36.556	40727.281	13369.354	0.342
6.000	10.414	193.123	37.089	42342.172	13699.589	0.272
5.000	10.500	205.192	39.084	43987.488	13505.460	0.209
4.000	10.530	207.045	39.325	45663.430	13934.214	0.152
3.000	10.645	228.633	42.956	47370.176	13233.128	0.101
2.000	10.723	233.972	43.639	49107.996	13503.809	0.057
1.000	10.801	246.794	45.698	50877.113	13359.875	0.018
0.000	10.884	252.847	46.462	52677.785	13605.342	0.000
-1.000	10.716	203.696	38.017	43898.156	13856.291	0.000
-2.000	10.605	166.826	31.462	35118.523	13394.739	0.000
-3.000	10.507	131.088	24.953	26338.893	12666.689	0.000
-4.000	10.386	86.935	16.741	17559.262	12586.628	0.000
-5.000	10.406	87.449	16.807	8779.631	6268.410	0.000
-6.000	10.433	79.814	15.300	0.000	0.000	0.000

Maximum stress is 13995.64 PSI, located at 29 FT above ground.