

PLP  
COMPOSITE TECHNOLOGIES INC.  
57 Creamery Road  
P.O. Box 429  
Fitzwilliam, New Hampshire 03447

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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.....	40 CMDR
Nautical yardarm.....	11 feet long, 26 feet above ground
Gaff.....	7.5 feet long, 26 feet above ground
Height of pole.....	40 feet
Depth of bury in ground.....	4 feet
Base diameter.....	6.802 inches
Tip diameter.....	3.106 inches
Flag size, hoist x fly.....	0 feet x 0 feet (polyester fabric)
Flags, nautical yardarm (2)...	0 feet x 0 feet (polyester fabric)
Flag, gaff.....	0 feet x 0 feet (polyester fabric)
Wind speed.....	150 MPH, gust factor 1.3
Material.....	PLP16, 50 inches wide
Breaking Stress.....	24000 psi
Modulus of Elasticity.....	2000000 psi
wall Th./Inside Dia. ratio....	.018

TABLE 2  
40 CMDR  
FLAGPOLE  
with 11 foot nautical yardarm and 7.5 foot gaff

BENDING MOMENT, STRESS, & 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
40.000	3.106	1.420	0.914	0.000	0.000	8.801
39.000	3.126	1.449	0.927	11.897	154.014	8.421
38.000	3.150	1.264	0.803	47.562	710.990	8.041
37.000	3.380	1.574	0.931	106.830	1376.621	7.662
36.000	3.580	1.881	1.051	189.338	2162.349	7.286
35.000	3.734	1.746	0.935	294.694	3780.519	6.914
34.000	3.934	2.050	1.042	422.568	4865.333	6.547
33.000	4.124	2.369	1.149	572.636	5980.147	6.188
32.000	4.304	2.701	1.255	744.584	7118.953	5.838
31.000	4.464	3.021	1.353	938.137	8318.793	5.497
30.000	4.634	3.387	1.462	1153.050	9466.446	5.168
29.000	4.942	6.917	2.799	1388.090	5950.265	4.850
28.000	5.102	7.635	2.993	1642.010	6583.778	4.540
27.000	5.176	6.935	2.680	1914.682	8574.363	4.238
26.000	5.326	7.573	2.844	2206.318	9310.508	3.946
25.000	5.446	8.110	2.978	2903.821	11699.641	3.664
24.000	5.734	13.744	4.794	3621.358	9065.086	3.394
23.000	5.834	14.503	4.972	4359.654	10522.533	3.135
22.000	5.934	15.289	5.153	5119.248	11921.341	2.887
21.000	6.126	20.164	6.583	5900.585	10756.147	2.650
20.000	6.206	20.998	6.767	6704.185	11888.750	2.424
19.000	6.394	28.388	8.880	7530.535	10176.958	2.209
18.000	6.464	29.379	9.090	8380.120	11062.788	2.004
17.000	6.524	30.247	9.273	9253.291	11975.130	1.809
16.000	6.686	36.569	10.939	10150.371	11134.766	1.625
15.000	6.736	37.443	11.117	11071.757	11950.993	1.452
14.000	6.898	44.500	12.902	12015.342	11175.150	1.288
13.000	6.948	45.534	13.107	12978.992	11882.651	1.135
12.000	7.106	55.396	15.591	13963.011	10746.810	0.992
11.000	7.146	56.402	15.786	14967.694	11378.252	0.858
10.000	7.278	64.253	17.657	15993.313	10869.433	0.733
9.000	7.308	65.110	17.819	17040.115	11475.517	0.618
8.000	7.430	73.248	19.717	18108.322	11021.029	0.511
7.000	7.450	73.888	19.836	19198.156	11614.294	0.414
6.000	7.608	86.143	22.645	20309.844	10762.350	0.326
5.000	7.628	86.883	22.780	21443.650	11295.982	0.247
4.000	7.648	87.628	22.915	22599.732	11834.801	0.176
3.000	7.770	97.077	24.988	23778.227	11419.222	0.115
2.000	7.780	97.486	25.061	24979.326	11961.038	0.063
1.000	7.872	106.145	26.968	26203.205	11659.823	0.019
0.000	8.010	119.714	29.891	27450.111	11019.992	0.000
-1.000	7.662	85.787	22.393	20587.584	11032.603	0.000
-2.000	7.360	59.606	16.197	13725.056	10168.367	0.000
-3.000	6.920	27.076	7.825	6862.528	10523.527	0.000
-4.000	6.802	18.529	5.448	0.000	0.000	0.000

Maximum stress is 11975.13 PSI, located at 17 FT above ground.