

# FLAGPOLE RESISTANCE TESTS

## INTRODUCTION

Fiberglass Flagpoles of America Inc.'s parent company, Deschamps SA, has mandated an engineering company to test its flagpoles in order to obtain regulation conformity approval in the European market, as well as qualify for insurance coverage.

The results of these tests indicate that Deschamps SA/FFA's flagpoles are of excellent quality and meet the most stringent European regulations.

## TESTS RESULTS

The tests have been conducted by APAVE, a company accredited to determine products' conformity to government regulations. APAVE has issued a report (reference # 01.55.MC.3096, dated 11/05/2001) stating that DESCHAMPS flagpoles (in this case a 12 meter – or 39.3 feet – flagpole, internal halyard, with a trap-door) are in conformity with the French N.V. 65 rules, a standard which is the most stringent in Europe, for a wide array of flag size. Flag size is an important parameter because it can result in a doubling of the effect of wind and of the forces which it creates on a flagpole.

In its conclusion, APAVE states that Deschamps' 39-foot flagpoles, equipped with flags up to 16.4ft X 4.9ft (corresponding to an 80.4sf area) can withstand wind speeds of up to 113.5 MPH.

It must be noted that when testing the effect of wind when using a larger flag measuring 19.7ft X 4.9ft (corresponding to 96.5sf area), the experiment had to be interrupted not because of the flagpole's weakness, but because of a noticeable deformation of the metal base-plate which maintains the flagpole anchored to the ground. This situation limited testing to a tension level of 2260 Newton (N), corresponding to wind speed of 109.4MPH (see table on last page).

The following comments must be made:

- Tests were carried out on a flagpole with a trap-door, which is inherently weaker than flagpoles without a halyard, or with an external halyard.
- We do not know whether the flagpole would have resisted to higher forces, since the tests were interrupted as soon as a metal base-plate deformation occurred.
- At that tension level, the pole was reacting normally.
- And above all, no flag can withstand wind speeds of 80 MPH, at which wind speed a flag is torn off the pole, resulting in a 'flagless' pole, which can withstand wind speeds of up to 194.6 MPH, as indicated in the summary table on the following page.

## SUMMARY OF TESTS CERTIFIED BY APAVE

The metal base-plate, which anchors the flagpole to the ground, on a 12-meter (approx. 39.3 feet) flagpole began to show signs of deformation when the weight (" F " on the diagram below), which generated a tensile force on the flagpole at a height of 9 meters (approx. 29.5 feet), **reached 222 kg (488lbs)**, the equivalent of a load slightly over 2260 Newton. This weight is equivalent to the sum of the forces generated by a constant 109.5 miles/hour wind on the flagpole and on its flag (19.7ft X 4.9ft).

The table below presents different combination of flag size and wind speeds resulting in the same tensile force on the flagpole. The formulas used to obtain these values are available upon request and are endorsed by APAVE:

**Weight applied (F): 488lbs**

Flag Size		Corresponding pressure daN/m <sup>2</sup>	Equivalent wind speed	
Height (ft)	Width (ft)		Meters/second	Miles/hour
NO FLAG		464.14	86.98	194.6
4.9	7.4	255.26	64.50	144.3
6.6	9.8	205.82	57.92	129.6
9.8	3.9	215.87	59.32	132.7
13.1	3.9	188.64	55.45	124.1
19.2	3.9	157.84	50.72	113.5
16.4	4.9	160.22	51.10	114.3
16.9	4.9	157.81	50.72	113.5
19.7	4.9	147.05	48.96	109.5

Thus, according to the above table, a 39.3-foot Deschamps/FFA flagpole carrying a 16.4ft x 4.9ft flag (80.4sf area, **also equivalent to an 8ft x 10ft flag**) flag can withstand winds of **114.3 miles per hour**. (It must be pointed out again that at such wind speed level, a flag is torn apart so that the flagpole can actually withstand a wind speed of 194.6 miles per hour.)

