Effective Projected Area (EPA) Calculation

Definition: EPA is a coefficient used by the lighting industry to determine how much force a luminaire will apply to the mounting brackets or pole at a given wind velocity. This value is used in combination with a luminaire's weight to determine the mounting requirements for a particular application.

Equation: To determine the EPA of a luminaire, the frontal projected area is multiplied by the drag coefficient of the luminaire.

EPA = (Frontal Projected Area) x (Drag Coefficient)
Where:
Frontal Project Area (FPA) is the maximum, achievable cross sectional area of the luminaire and it's mounting as installed. This is measured in square feet (ft^2).

> For example, the FPA of the Hydrel 7200 Series flood luminaire is taken as the front cross sectional area. The FPA of the Hydrel G2 XTEND pole mounted luminaire, however, is taken as the fixture's side cross sectional area.

Drag coefficient (DC) is a number that aerodynamicists use to model all of the complex dependencies of drag on size and flow conditions. The Drag coefficient number is a dimensionless constant defined by:

$$DC = \frac{Drag}{Air\ Density\ x\ Frontal\ Area\ x\ 0.5\ x\ (Air\ Velocity)^2}$$

Air Density, Frontal Area, and Air Velocity are known variables. Drag must be determined experimentally.

Since we do not have the resources to establish the proper drag coefficient, worst case assumptions can be used for the most common luminaire shapes experienced. Wind speeds that are considered less than 200 mph.

The assumed Drag Coefficient values are:
> Flat Plate Body DC = 1.20
> Spherical Body DC = 0.85
> Angled Body DC = 1.00

Example: Calculate the EPA for the Hydrel 8200 YM flood light.

> **Solution:**
> Frontal Project Area (FPA) which is front cross sectional area including the body, yoke, and caps = 2.09 ft^2.
> Assumed Drag Coefficient = 1.20 (flat plate area)
> EPA = (Frontal Projected Area) x (Drag Coefficient)

→   ***EPA =*** 2.09 x 1.20 = ***2.51* ft^2.**

References:
http://www.lerc.nasa.gov/WWW/K-12/airplane/short.html
Horner's book of *Fluid Dynamic Lift* and *Fluid Dynamic Drag.*
ASSHTO 1985