

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
1	Wind Turbine - Wind Tunnel Data and Calculator Fall 2016																
2	VAWT-Under test Team ____																
3																	
4	Measured					Calculated											
5	Wind Velocity Target	Wind Velocity Actual	Load Resistor	Load Voltage	Generator Frequency	Rev./min	Actual Wind Velocity	Wind Power	Generator Power	Rotor Tip Speed	Tip to Speed Ratio	(Electrical) Power Coefficient					
6	(mph)	(mph)	(ohms)	(v-rms)	(Hz)	(rpm)	mps	(watts)	(watts)	(m/s)	(ratio)	(ratio)					
7	v	v	R _L	V _L	F	rpm	v	P _W	P _E	Ω	λ	C _p					
8	9		no-load														
9			4700														
10			27														
11			15														
12			10														
13			5														
14			1														
15	11		no-load														
16			4700														
17			27														
18			15														
19			10														
20			5														
21			1														
22	13		no-load														
23			4700														
24			27														
25			15														
26			10														
27			5														
28			1														
29	15		no-load														
30			4700														
31			27														
32			15														
33			10														
34			5														
35			1														
36																	

Wind Turbine Variables

Height H =		(cm)
Diameter D =		(cm)
Coil Resistance R _G =		(ohms)
Sweep Area A =		m ²

Generator v/100rpm 0.5

Conversion Factors and Constants

rpm = 30 F	Ω
1 rps = rpm/60	Ω
1 in. = 0.0254 m	λ
1 m/s = 2.2 mph	π

$\rho = 1.23$

Equations

A = D H Sweep Area

$P_W = 0.5 \rho A v^3$ Available Wind Power

$P_E = V_L^2 (1 + R_g / R_L) / R_L$

$\Omega = \pi D * rps$ (m/s D (meters)

$\lambda = TS / v$ (Turbine tip speed/ wind speed)
v (m/s)

$C_p = P_E / P_W$ Power Coefficient

