

Table 1 - Vortex Engine Process Calculations.

<u>Air properties:</u>	<u>Case 1</u>	<u>Case 2</u>	<u>Case 3</u>	<u>Case 4</u>
P_1 (kPa)	101.1	101.1	101.1	101.1
T_1 (°C)	25.8	25.8	25.8	33.6
$r_1 = r_2$ (g/kg)	16.87	16.87	16.87	16.87
U_1 (%)	80.0	80.0	80.0	50.1
$s_1 = s_2$ (J/K·kg)	241.0	241.0	241.0	267.7
h_1 (J/kg)	68910	68910	68910	76990
$P_2 = P_3$ (kPa)	101.1	97.72	97.70	97.73
ΔP_{12}	0	3.38	3.40	3.37
T_2 (°C)	25.8	22.92	22.91	30.6
U_2 (%)	80.0	92.3	92.3	57.6
h_2 (J/kg)	68910	65930	65920	73940
T_3 (°C)	25.8	24.5	30.7	30.6
U_3 (%)	80	97	57.4	57.6
$r_3 = r_4$ (g/kg)	16.87	19.57	16.87	16.87
$h_3 = \mu_3 = \mu_4$ (J/kg)	68910	74430	73990	73940
$s_3 = s_4$ (J/K·kg)	241.0	269.7	268.0	267.7
P_4 (kPa)	10.0	10.0	10.0	10.0
T_4 (°C)	-87.1	-80.92	-82.2	-82.3
z_4 (m)	16570	16570	16570	16570
h_4 (J/kg)	-96210	-91130	-91150	-91180
<u>Heat Input</u> (J/kg)				
$Q = h_3 - h_2$	0	8500	8070	8080
<u>Work</u> (J/kg)				
$W = h_1 - h_2$	0	2980	2990	3050
<u>Velocity</u> (m/s)				
$v = (2W)^{0.5}$	0	77.2	77.4	78.1
<u>Efficiency</u> (%)				
n (%) = W_{12}/Q_{23}	n/a	35.1	37.1	37.8
n (%) = $1 - T_4/T_3$	n/a	35.4	37.2	37.2
<u>Heat source</u>	None	26°C water at P_2	36°C dry heat at P_2	40°C dry heat at P_1