Alab Fine Bubble Air Lift Pump Test Report

Date: December 24, 2008 Test Vessel: Swimming Pool Depth: 63”

Diffuser

Shape: Square 12” x 12” Usable Surface Area: 144 sq. in.

Pump Tube

Internal Diameter 4.5” Material 6 mil Polyethylene Length 55”

Objective: To determine what if any advantage may exist in using a larger fine bubble diffuser as opposed to a smaller fine bubble diffuser to provide air to a pipe column set up as an airlift pump. Retest

Air Flow	Maximum Lift	Liquid Flow at 1”	Liquid Flow at 2”	Liquid Flow at 3”	Liquid Flow at 4”	Liquid Flow at 5”
20.0 lpm 42.6 CFH	10½”	204.0 lpm 53.8 gpm	140.4 lpm 37.0 gpm	108.75 lpm 28.7 gpm	87.3 lpm 23.0 gpm	63.5 lpm 16.8 gpm
Course bubble diffuser (same setup as above)						
20.0 lpm 42.6 CFH	7½”	160.8 lpm 41.8 gpm	125.1 lpm 32.5 gpm	96.0 lpm 24.9 gpm	67.0 lpm 17.4 gpm	42.0 lpm 10.9 gpm
W/O Diffuser (similar setup as above)						
18.88 lpm 40.0 CFH	5”	114.0 lpm 30.12 gpm	69.25 lpm 18.29 gpm	34.4 lpm 9.09 gpm	18.8 lpm 4.97 gpm	
12x12 at low flux						
5 lpm 10.6 CFH	4¾”	57.6 lpm 15.2 gpm	30.3 lpm 8.0 gpm	13.4 lpm 3.5 gpm		
Similar setup small (3”x3”) diffuser						
5 lpm	2 ¾” no flow	33.12 lpm 8.7 gpm	9.4 lpm 2.5 gpm	2 ½” 2.3 lpm .6 gpm		
Diffuser Removed						
5 lpm	1 ¾” no flow	6.25 lpm gpm	1 ½” .97 lpm			

Observations: The larger diffuser is capable of greater airflow than the smaller diffuser. The larger diffuser is capable of providing a greater ratio of gas to liquid within the airlift column. The higher the ratio of gas to liquid the greater the lift capacity. The larger diffuser also maintains the ultra fine bubbles at the higher flux.

Conclusions: Fine bubbles are more effective than course bubbles in operating an airlift pump. They provide more lift and greater water flow at equal airflows. The larger diffuser provides for greater airflow, which extends the performance of the pump. The next step would be to calculate energy savings in order to show a cost of operation benefit.