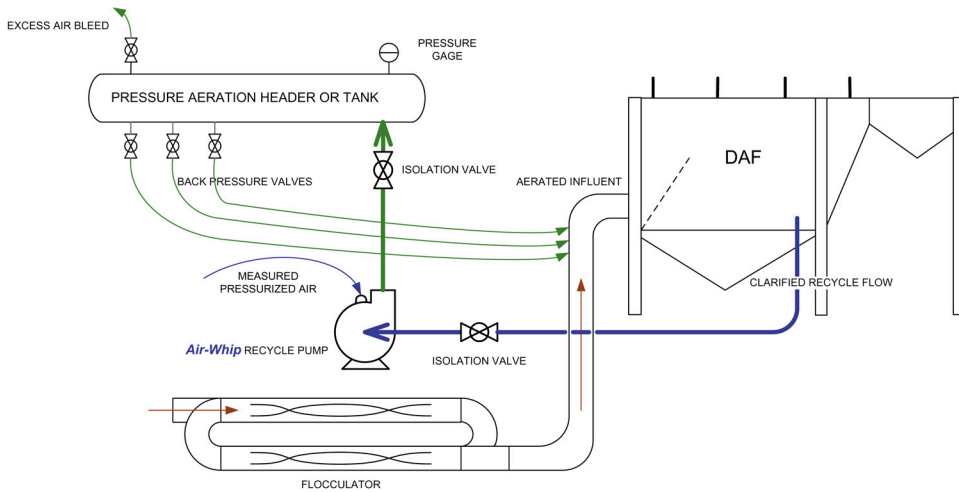




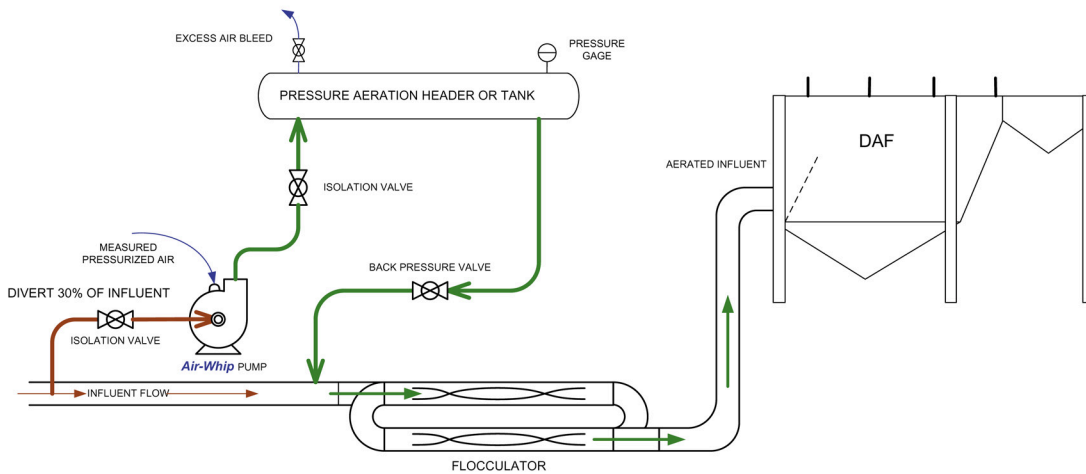
## Air-Whip DAF Application Layouts



### Standard Recycle Layout

- Uses 20% to 50% of DAF capacity
- Clarified Water from DAF discharge
- Most commonly used in new DAFs
- Efficient power usage
- Reduced DAF throughput capacity
- Low risk of oil emulsification

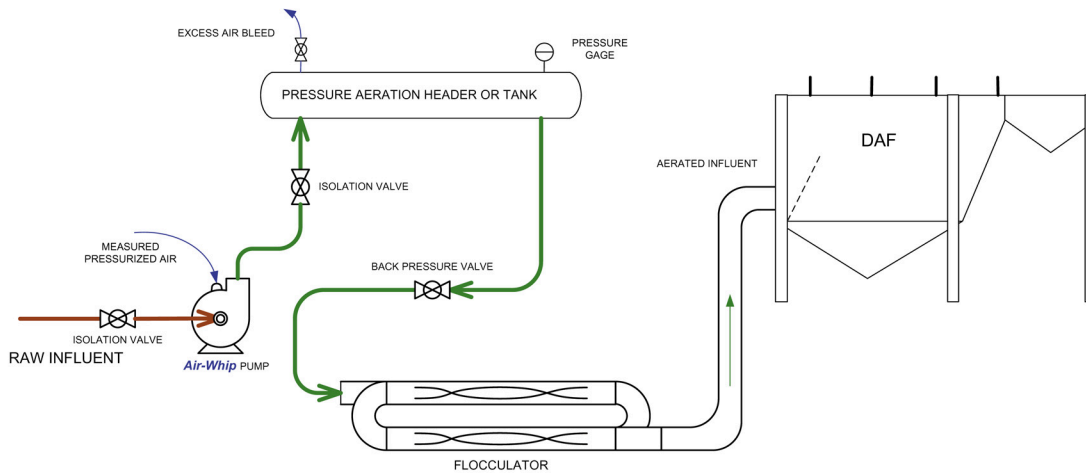
### STANDARD RECYCLE AERATION LAYOUT



### Split Flow Aeration Layout

- Does not use any of DAF's capacity
- Uses Sidestream of Influent Flow: (Uses 25% to 50% of Influent Flow)
- New Concept in DAF Aeration
- Same power usage as recycle
- Increases DAF throughput capacity when converted from Recycle
- Can dramatically improve DAF separation performance

### SPLIT FLOW INFLUENT AERATION LAYOUT



### Full Flow Aeration Layout

- Does not use any of DAF's capacity
- Pressurizes & Aerates full raw flow
- Commonly used in older DAFs
- Inefficient power usage
- Increases DAF throughput capacity when converted from Recycle sys.
- Can dramatically improve DAF separation performance

### FULL FLOW INFLUENT AERATION LAYOUT

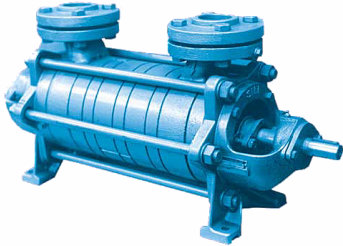
(TURN OVER FOR ADDITIONAL INFORMATION)



Bringing Sensible Solutions to Difficult Problems

## Air-Whip Information Bulletin

**HISTORY:** Early Dissolved Air Flotation (DAF) devices used standard pumps which fed water into a saturation tank under pressure. The water was sprayed against baffles to create maximum air-to-water interface for the purpose of forcing the air to dissolve in the pressurized water. The spray nozzles would become clogged and the baffles would become corroded and rusted and deteriorate, making the saturation less effective.



Attempts were made to feed air into the inlet of standard pumps to create better air-to-water contact in order to eliminate the sprays and baffles. Unfortunately, just a little air would cause the pumps to cavitate. To address this problem, the industry turned to multi-stage turbine pumps similar to the one pictured above which were capable of handling significant air fed into the inlet without losing pressure and provided plenty of internal shear and turbulence, creating the desired interface.

The primary drawback with the multi-stage turbine pump was its intolerance to **entrained solids** found in waste water. Because of this problem, the pump had to be used strictly as a RECYCLE pump, drawing clarified water from the bottom or the discharge of the DAF which was theoretically free of solids. Unfortunately, in the world of waste water treatment, it is nearly impossible to keep solids out of the pump in many. This problem causes premature failure of the pump, forcing the user to **repair or replace** it. Multi-stage turbine pumps are very **difficult and costly** to repair. It is not unusual to have to replace the pump after just a few months of use.

**SOLUTION:** There were many attempts to use pumps which can handle solids, but they are too sensitive to cavitation when air is injected and would quickly lose pressure. Closed impeller pumps did a little better with the air, but that type has difficulty with handling entrained solids in the water stream as well.

Recently, **KeysTec, LLC** developed a method of introducing air into an open impeller pump, creating an aeration system that could make excellent aerated water (white water) **and pass solids**. Air is thoroughly sheared within the pump, providing maximum air-to-water interface. The impeller in the Air-Whip pump is fully open (see photo to left). The Ampco M-Series pump on which the Air-Whip design is based is specifically designed to pass substantial solids.



Its size and rotational speed results in the desired pressure needed for DAF aeration systems. The pump is vastly **simpler than the turbine type pumps** and therefore will last many

years, requiring **simple maintenance**. Ampco Pumps designed this **cast stainless steel** pump to be easily dismantled, another plus when repairs are needed or a stick of wood or piece of rope gets into the impeller.

**ADVANTAGES:** The open impeller design allows this pump to be used where the waste water is unscreened. The close couple design of the Air-Whip pump **inexpensive**. Repair parts are available from any Ampco Pump supplier. The most remarkable feature of this pump is its ability to freely pass all sorts of entrained solids found in waste water streams. The open impeller design allows it to be used in an untreated waste water



stream. This capability means it can aerate the raw waste stream in either a full influent pressurization mode or our newly developed "split" influent pressurization mode. This has proven to be a significant advantage as follows:

**INCREASED DAF CAPACITY:** When used full and split influent pressurization modes, DAF CAPACITY is no longer used for the recycle flow. This flow is typically 20% to 50% of the DAF throughput capacity. By aerating the influent, the treatment **capacity of the DAF can be increased** by the same percentage while enjoying the savings and long life of the Air-Whip design. Aerating the untreated stream will often improve the separation efficiency of the DAF as well. By creating micro-bubbles before the flocculant is added, more of the solids are attracted to the floc and the bubbles are incorporated more completely in the floc, resulting in better rise rates, further increasing the DAF efficiency.

**STANDARD RECYCLE MODE:** The Air-Whip pump can directly replace turbine style recycle pumps on an existing DAF. Much larger recycle flows are possible, often replacing two turbine pumps with one Air-Whip pump on large DAF units. The Air-Whip pump has a **broad flow range at pressure**, allowing greater freedom in adjusting the DAF performance. Recycle pump replacement can be done with only minor modifications to the piping and air supply.

**FULL FLOW AND SPLIT FLOW AERATION:** These modes entail simple process modification, placing the Air-Whip in the influent stream. This method of aeration/pressurization will eliminate the need for multiple injection lines and valves which plug up and are difficult to balance. As stated, this mode will **increase your DAF capacity** by the same amount as the former recycle flow.

A layout of the three operation modes can be seen on the other side of this information bulletin. Consult your supplier for further information on modifications to your DAF system.