

WPL DAF

Dissolved air flotation - sludge thickening for municipal applications

Performance, quality, reliability



sludge thickening | industrial effluent treatment
new projects | existing plant upgrades | replacement plants



Environmental Wastewater Solutions

The WPL DAF (Dissolved Air Flotation) Sludge thickening in municipal applications

Background

DAF systems have been installed across Europe at municipal wastewater treatment works in many sludge thickening applications. These systems have been used most efficiently for minimising sludge waste from activated sludge and suspended growth biological treatment processes. Thickening applications include sludge from:

- primary settlement tanks
- trickling filters
- final settlement humus tanks
- aerobically digested sludge
- sludge containing metal salts from chemical treatment.

The WPL DAF plants can be applied successfully to a range of wastewater sludge requirements, and demonstrate certain specific advantages over more conventional solids removal processes.

Furthermore, the WPL DAF plants can be designed to be small, compact and robust systems with a high rate of operation. These systems are capable of coping with reasonable variations in influent wastewater quality, and variations in flow. Balancing tanks can be used to even out any very large flow variations.

Basic Operation

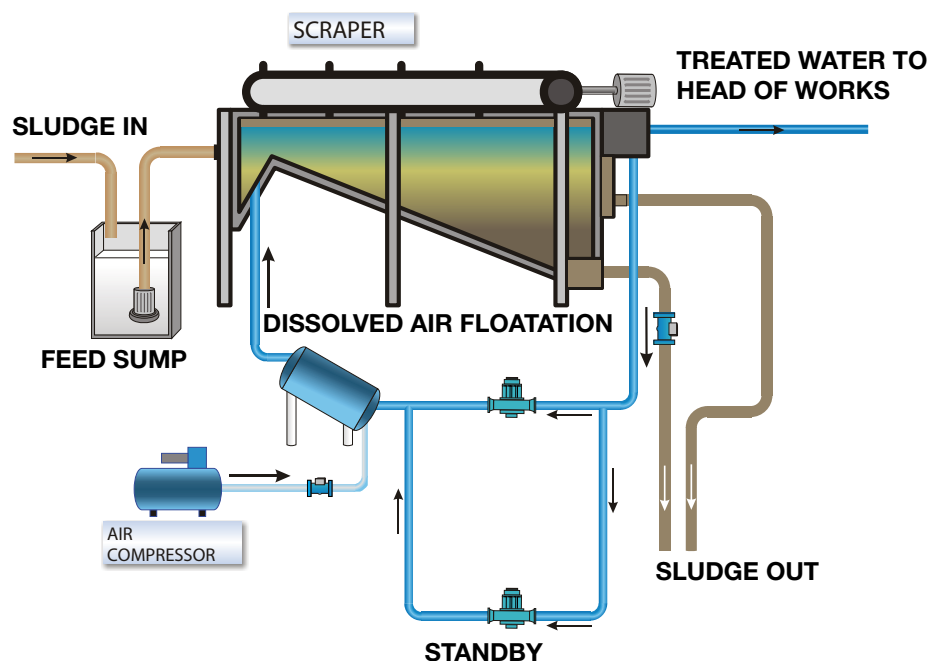
The WPL DAF is a purely physical process which operates on a reasonably simple design philosophy. Incoming effluent may require pre-treatment as necessary, e.g. the addition of chemical coagulant(s) and/or flocculant(s) may be required with associated mixing and coagulation/flocculation stages. Adjustment of pH may also be a consideration to ensure optimum conditions for coagulation and flocculation.

The incoming effluent enters the flotation vessel where it comes into contact with recycled, treated effluent (sometimes termed white water). The percentage of the total effluent flow into which air is dissolved under pressure and subsequently recycled will be determined by several factors. Increasing the pressure within the vessel where the air is being dissolved ensures that a higher concentration of air dissolves into the liquid phase than is possible at atmospheric pressure.

Once this saturated effluent enters the flotation tank, the pressure is released back to atmospheric pressure. This immediately results in the recycled flow becoming supersaturated, resulting in the generation of microbubbles as the dissolved air comes back out of solution.

These bubbles attach to, and form within, the solids or chemical flocculants entering the vessel, causing them to float to the surface where they are retained and subsequently removed by a mechanical skimmer.

Within the rectangular flotation tank, the skimmer mechanism consists of a series of paddles or 'flights' which run on a plastic corrosion resistant chain, and skim just below the surface of the tank removing the 'float' into a trough for recovery of the sludge. To eliminate the risk of sludge build-up on the flotation tank floor, the design may also incorporate a floor scraper.



Features:

- Main structural components are manufactured in 304 stainless steel for added corrosion resistance
- Higher specification can be supplied if required
- Reinforced plastic components used to reduce wear and corrosion, reducing maintenance time and cost
- White water system utilises a pressure vessel to negate the need for diffusers within the flotation tank, hence reducing maintenance requirements
- PVC coil pipe flocculator eliminates corrosion, and comes with numerous sampling and injection points to improve efficiency
- System comes complete with safety guards, grids, ladders and handrails to provide safe working access.



Case Study - Large Municipal Works Sludge Thickening DAF Application



1. Waste sludge from the final clarifier is pumped up to a sludge storage tank. The sludge at this point is approximately 0.4% dry solids.



2. The sludge is pumped up to the DAF cell. The cell is designed specifically for sludge thickening with a throughput of 15m³ per hour.



3. After flotation the sludge thickens to around 5% dry solids. The flights then remove the sludge over the beach in a continuous process. The sludge drops by gravity to a sludge storage tank.



4. The cleaned water is used in the process to generate white water with the bulk going back to the head of the works. No chemical addition is used in this application.