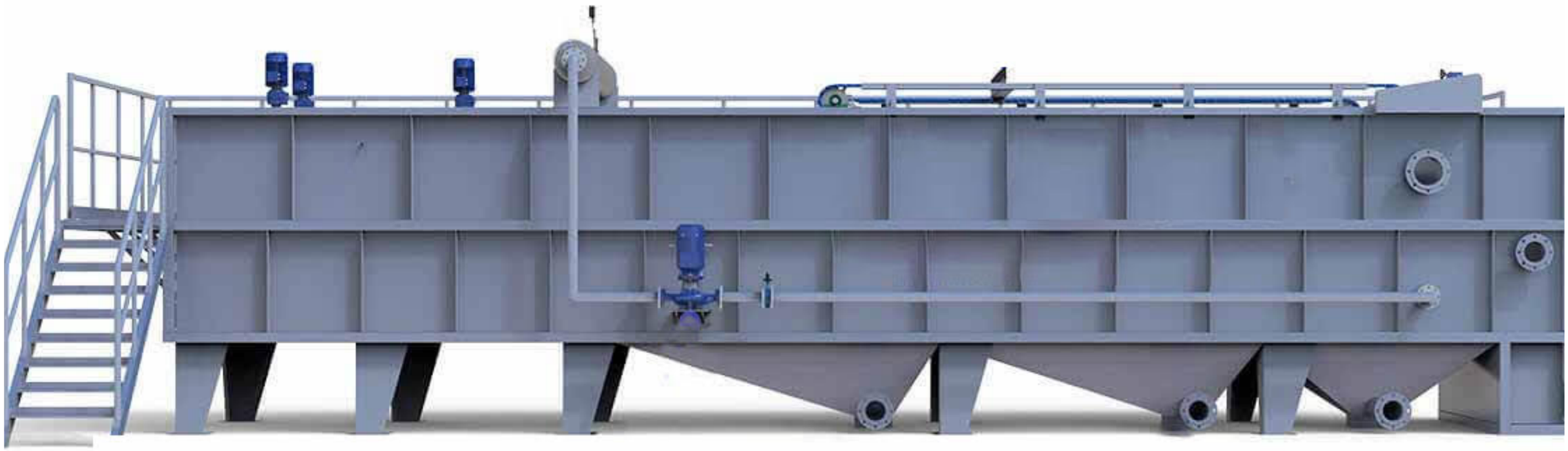
DISSOLVED AIR FLOTATION SYSTEMS

2-STAGE DAF SYSTEM FOR WASTEWATER

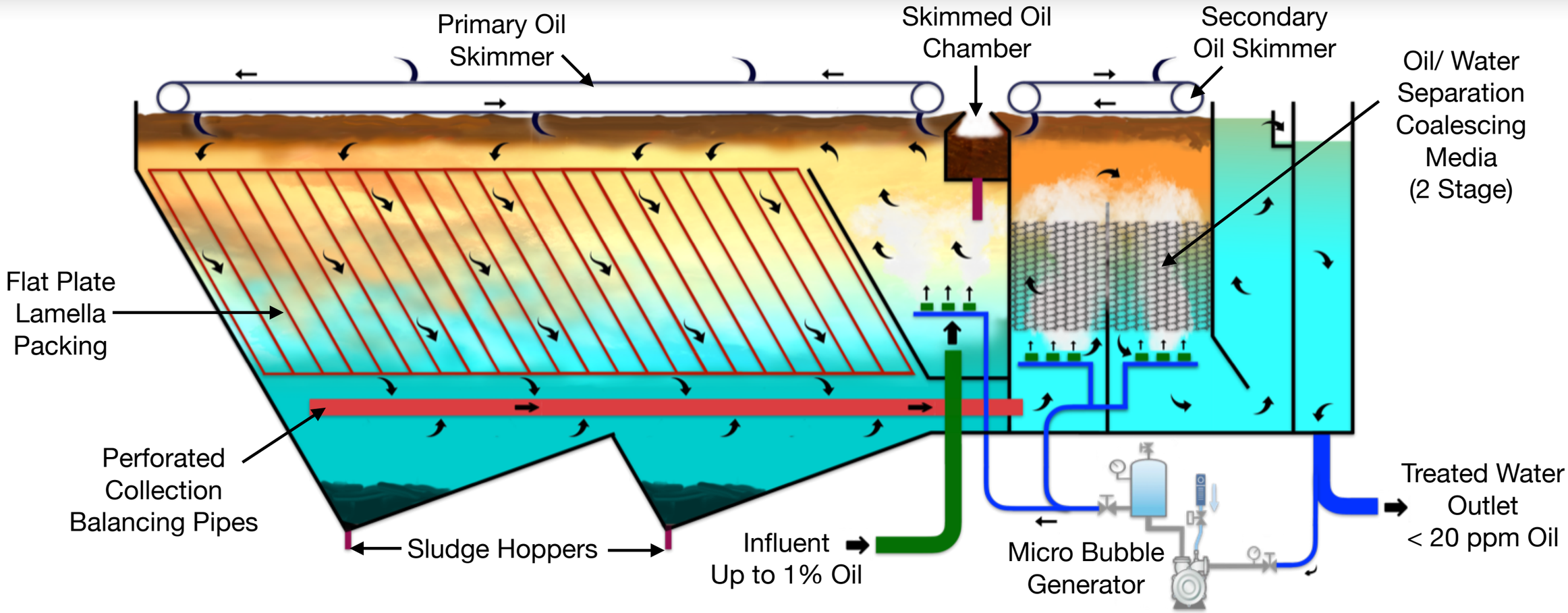
PREMIUM QUALITY

GENERAL DESCRIPTION

BASIIA is a leading source for the Dissolved Air Flotation (DAF) design, engineering, and customized services. A well-designed, properly functioning Separator is a tremendous piece of wastewater process equipment for treated sewage effluent and the produced water. DAF System can be sized for great volumes and retention time. We offer an extensive range of standard sizes and capacities with complete accessory packages, including chain and flight scraper system, C-pipe oil Skimmer with drive mechanism, leak and level sensors, alarm/ control panels, influent, effluent and oil pump systems. DAF systems are designed to remove total suspended solids (TSS), biochemical oxygen demand (BOD), fats, oils and greases (FOG) from the produced water stream. It is a proven and effective physical/ chemical technology for treating a variety of industrial and municipal process. DAF systems are commonly used to meet a variety of treatment goals.



PROCESS DESCRIPTION & WORK PRINCIPLE



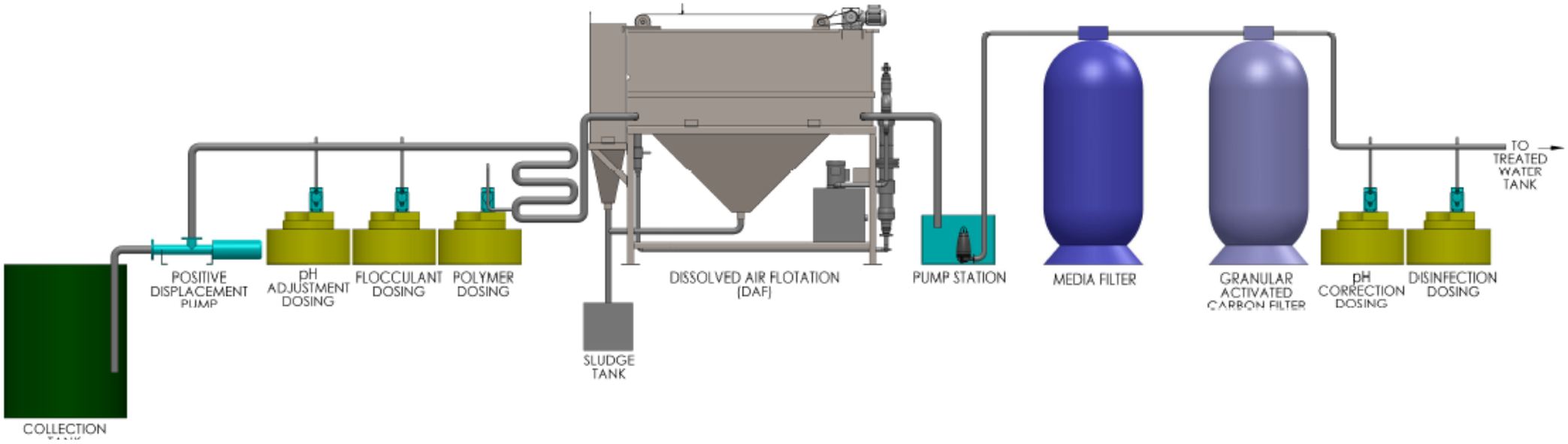
The wastewater stream enters the Dissolved Air Flotation Systems (DAF) from the inlet compartment in the middle through a perforated pipe the distribute the influent water equally. The raw water is mixed with the nano/ micro-bubbles stream generated by the shear pump, the dissolved air-in-water solution is produced by withdrawing ambient air into a recycle stream of clarified DAF effluent, These micro bubbles attach to any particles in the water causing their density to become less than that of water. The particles then rapidly float to the surface for collection and removal and form a floating bed of material that is removed by a surface skimmer leaving the clarified water behind. After that, water will move gravitationally to two stages of lamella clarifiers, where it will block the oils and fats and prevent them from passing from the top to the bottom, on the other hand, flat plate lamella packings separate settleable solids and oils. Basically, all solids and oils that settle in a given time will be separated easily and economically within the lamella separator.

PROCESS DESCRIPTION & WORK PRINCIPLE

FUNCTION

The DAF separates the suspended solids and lighter liquid contaminants from the water by moving them to the surface of the DAF vessel and then scraping them off the surface.

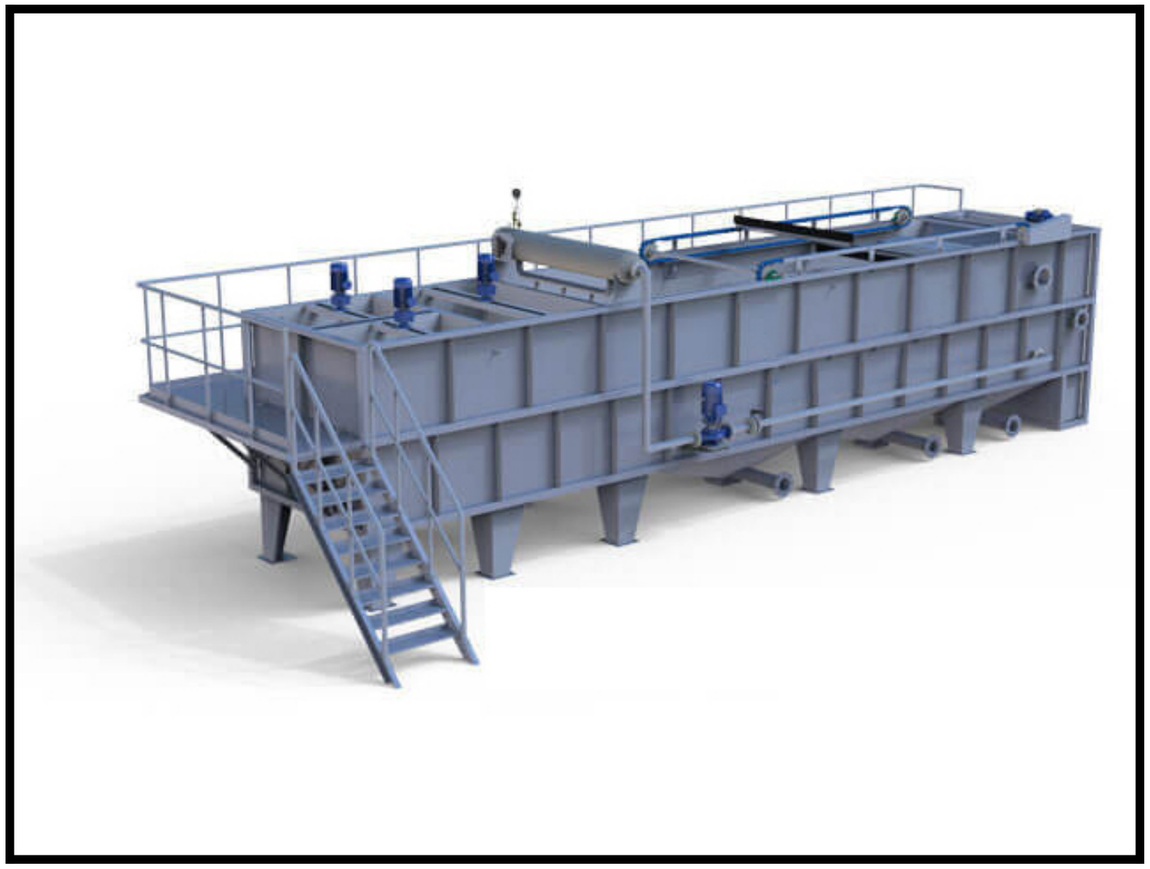
A pressurized, stream of air-saturated treated water is mixed with the flocculated water, and with the release of pressure a cloud of very fine air bubbles carries the suspended solids and lighter liquids to the tank surface. Clean water overflows from the DAF tank, via an under/over-weir, to sewer, or to the next stage of the treatment process. The overflow level is adjustable and controls the level in the DAF flotation section. The sludge on the surface of the DAF is scraped into a sludge hopper by a mechanical scraper. The DAF system can be automated via a programmable logic controller (PLC) mounted within a control cabinet on the system.



PROCESS DESCRIPTION & WORK PRINCIPLE

The wastewater will flow between lamella plates from the top to the bottom of the tank. Small particles and oils adhere to the plates and gather to form larger and larger particles until their weight and concentration between the plates increases to a certain extent. The collected oil droplets will float to the top of the water where the chain skimmer will take the floating oil and scum to the skimmed oil channel.

The solids fall to the plate surface, where they slide by gravity down to the sludge collection hoppers, and the treated water will pass to the perforated pipe under the lamella packing.



The perforated pipe will balance the flow through the lamella and deliver water to the second refining stage of the Oil/ Water Separation Coalescing Media Compartment, this media provides a suitable surface for oil droplets to meet and grow, or coalesce, into larger droplets. As oil droplets grow in size the buoyancy of the droplets increases. in this stage, the system will ensure that no oil droplets are longer in the water stream. The second stage contains another micro bubble diffusers to assist the oil flotation through the coalescing packing.

PROCESS DESCRIPTION & WORK PRINCIPLE

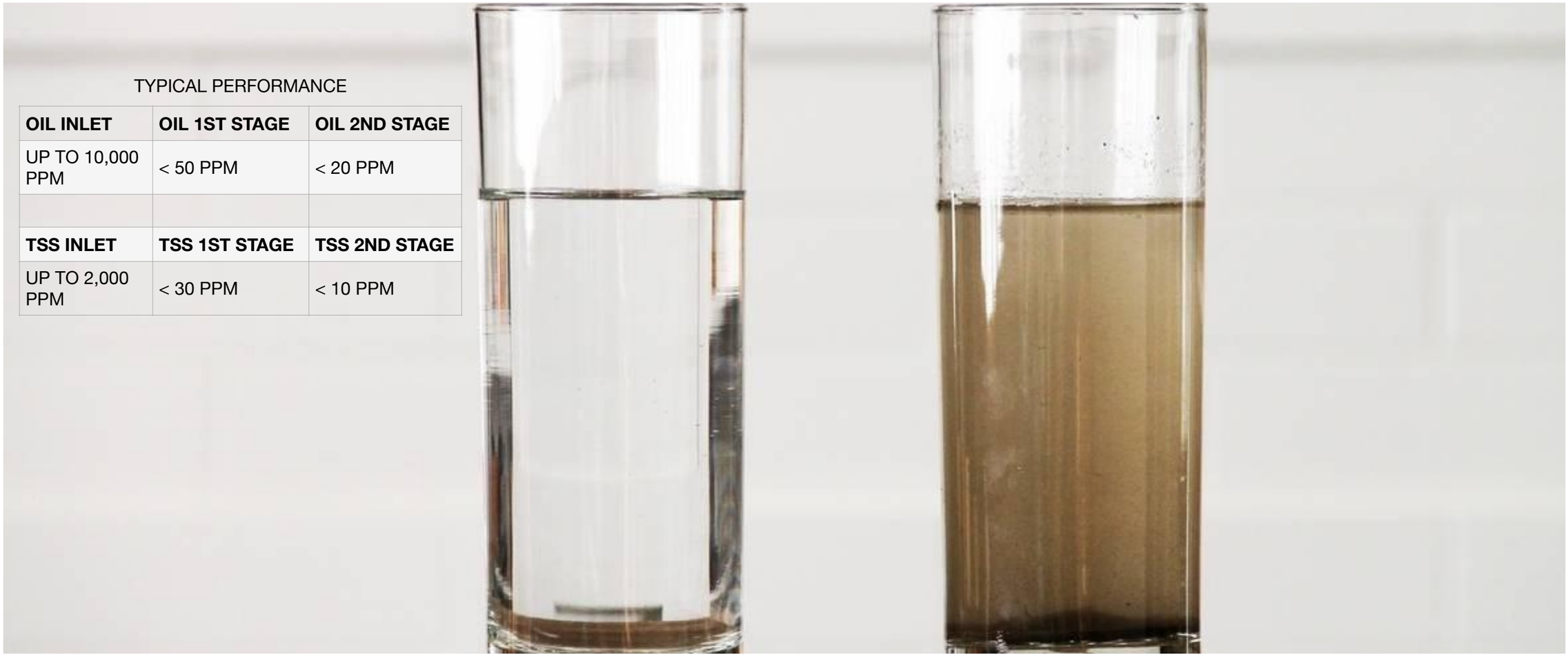
Clarified effluent from a DAF unit is pumped by the DAF pump under high pressure. Air is introduced into the pump suction by an educator loop. The air is sheared into small bubbles by the pump and then dissolved into the water by the high pressure. However, most DAF systems account for some sedimentation and settled sludge removal. Variations in capacity, arrangement, dimensions, and pipe penetration locations can be made to fit your specific requirements. These DAF Systems are designed to accept gravity flow, the volume allows for a longer retention time for sand, grit, free oil, and grease to separate from the water due to their differences in specific gravity.

OIL AND GREASE REMOVAL QUALITY

We offer our clients an optimum quality DAF systems for Oil and Grease Removal which is processed at our end without using chemicals, our system based on the advanced processing techniques in accordance with the set municipal and industry standards. Owing to its high effectiveness and optimum purity, our DAF systems are widely demanded among our valuable clients. Further, to ensure the best quality, the provided remover is stringently tested by our skilled quality controllers on various quality parameters. Dissolved air flotation (DAF) is a water clarification process that uses micro-bubbles to remove oils and grease.

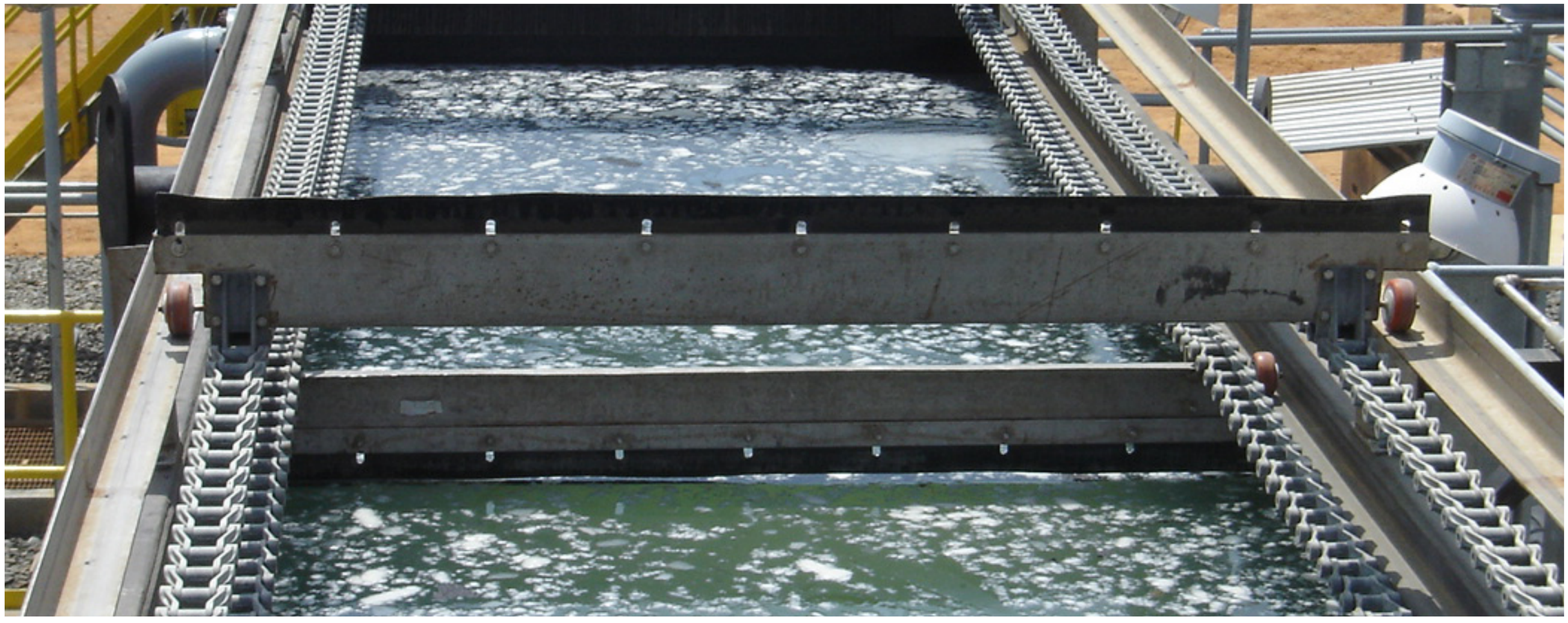
TYPICAL PERFORMANCE

OIL INLET	OIL 1ST STAGE	OIL 2ND STAGE
UP TO 10,000 PPM	< 50 PPM	< 20 PPM
TSS INLET	**TSS 1ST STAGE**	**TSS 2ND STAGE**
UP TO 2,000 PPM	< 30 PPM	< 10 PPM



CHAIN SKIMMER SYSTEM

Our chain Skimmer system is reliable and user-friendly solution for rectangular settling basins. They can be used in various applications, such as, water and wastewater treatment, API oil-water separation, and storm water treatment. The chain scrapers can be built one on top of the other in 2 – 3 layers, and are applicable for rectangular basins up to 100m long and 12m wide. Our chain scrapers are available in two/three-shaft (bottom or surface) or 4-shaft (bottom and surface) configurations, depending on the clarifier type.



DESIGN FEATURES

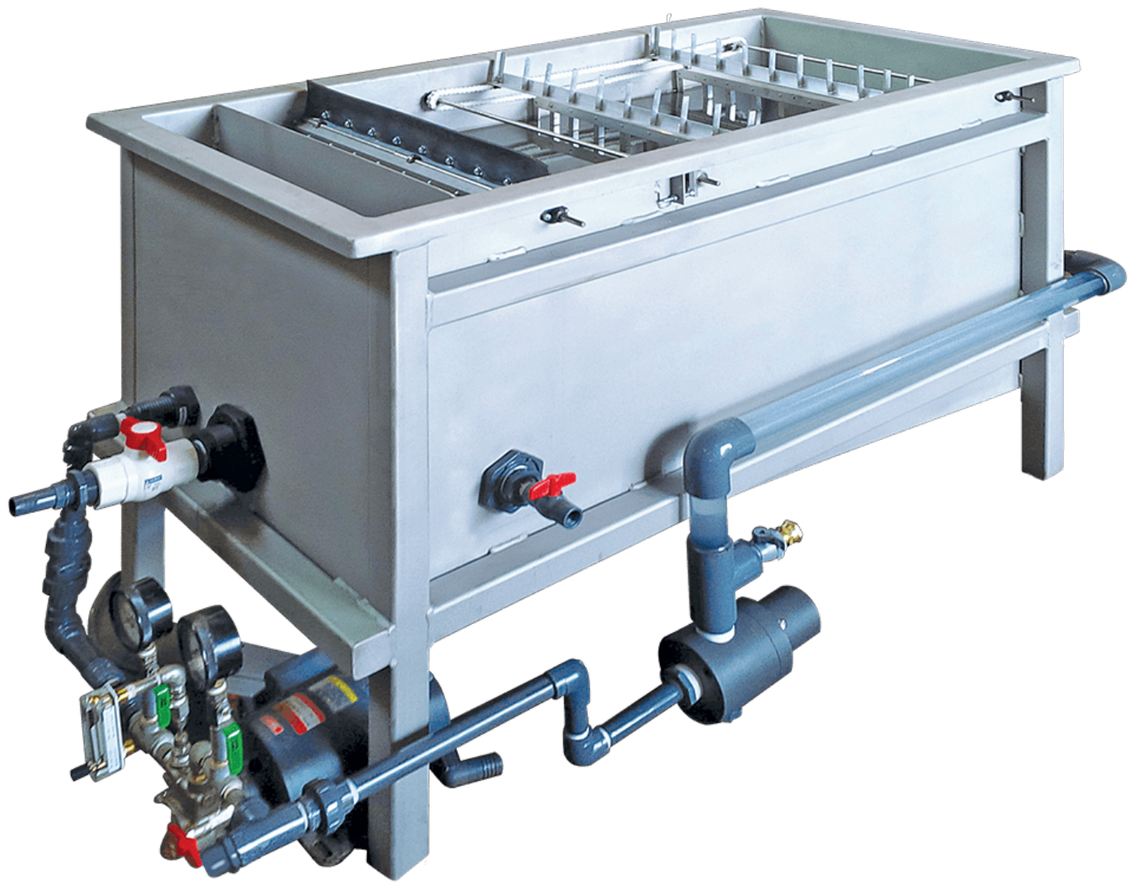
OVERVIEW

Our DAF systems are available as packaged carbon steel tanks or containerized systems.

DESIGN FEATURES

Our Advantage:

- Designed to achieve maximum treatment efficiency in a compact footprint
- Designed to remove a variety of contaminants with a single system
- Standard designs for fast lead times
- Optimized designs to suit client's objectives
- Fully customizable to accommodate client specific engineering standards, vendor data requirements and site preferred electrical equipment
- High quality Saudi Arabian designed and built systems
- Nationwide service & maintenance capabilities
- Remote monitoring for expert process support



DESIGN FEATURES

Typical Performance Results

The following table summaries typical plant performance parameters:

Parameter	Unit	Treated Water (typical)
FOG Removal	%	85~95
TSS Removal	%	70~90
COD Removal	%	20~40
BOD Removal	%	20~30

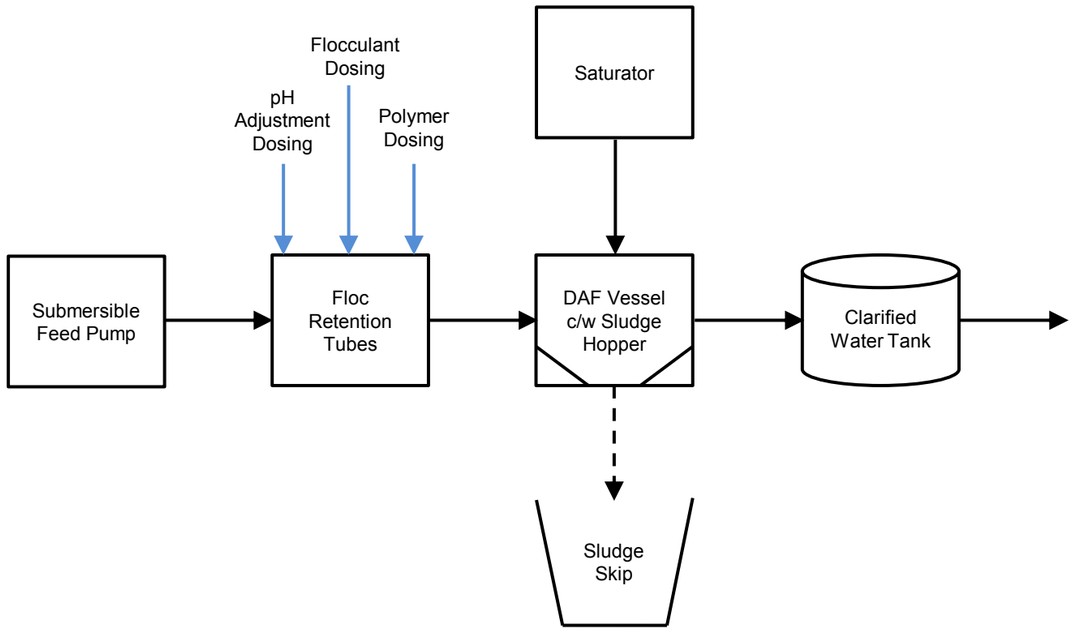
- We recommends a water analysis be carried out prior to detailed design.
- DAF process only removes particle associated BOD.

DESIGN FEATURES

Submersible Feed Pump

Where the wastewater is collected in a suitable underground collection pit/ tank, a submersible feed pump can be provided to transfer wastewater directly from the collection pit into the DAF, eliminating the need for an additional tank and feed pump.

The system is controlled by level switches that automatically switch on/off the submersible feed pump.



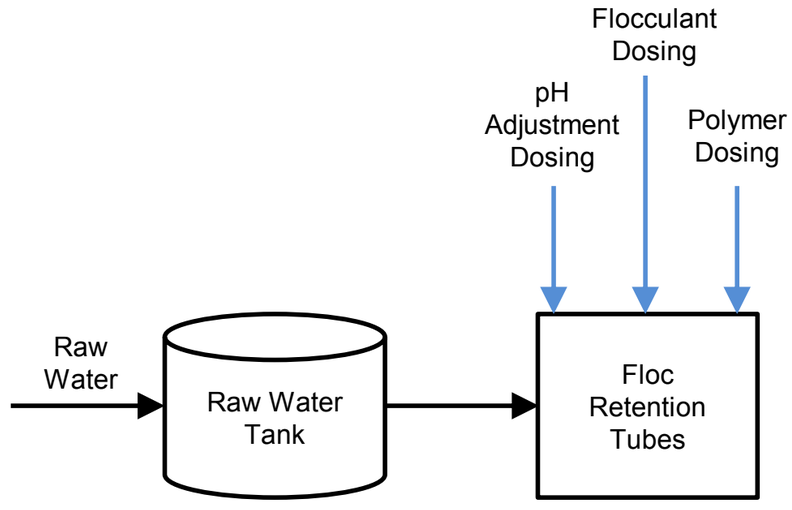
DESIGN FEATURES

Flow Based pH Correction and Flocculation

The pre-clarification chemical dosing can be optimized by the addition of a magnetic flow meter and variable speed dosing pumps.

The magnetic flow meter sends a reading back to the PLC which then controls the chemical dosing to enable precise dose rates, based on flow rate and predetermined dose rates.

This provides operational flexibility and minimizes chemical wastage by overdosing.

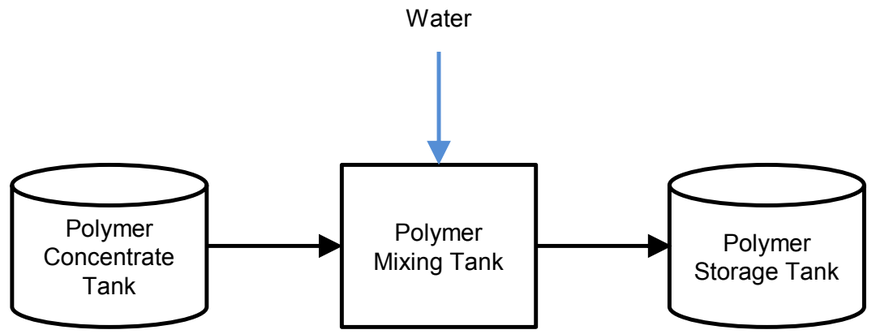


Automated Polymer Batching System

In instances where there is high polymer use, it may be cost effective to purchase a concentrated polymer and mix on site. Noting that the mixed polymer will have a short shelf life (one week).

The polymer storage tank is automatically replenished as the polymer is used. The new polymer is produced from a polymer concentrate mixed with water.

The polymer concentrate dosing pump will slowly pump concentrate from the polymer concentrate tank into the polymer mixing tank. The polymer mixer will run for approximately 10 minutes to thoroughly mix the polymer. Once the polymer is mixed the polymer transfer pump transfers the new polymer into the polymer storage tank.

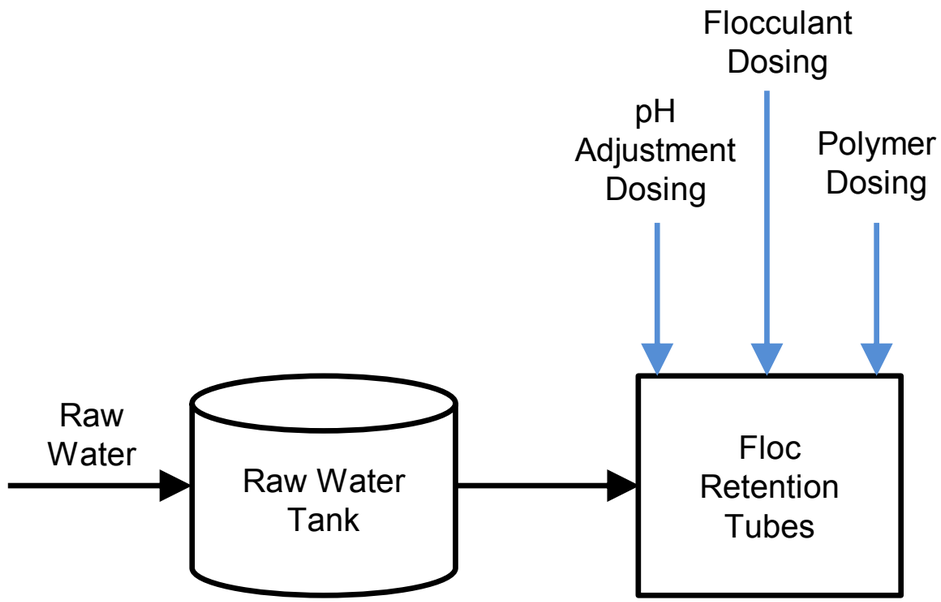


pH Correction and Flocculation

The feed pump takes flooded suction from the raw water tank and pH (if required) of the raw water is adjusted inline, based on pH transmitter reading, so as to optimise conditions for downstream removal of contaminants in the flocculation and clarification stages. Typically ideal pH is in the slightly alkali range (8-9) but the final set point is determined during commissioning.

Once the pH correction process is completed, two flocculation chemicals, a coagulant and flocculant are injected into the waste water in preparation for the clarification process. The flocculant retention tube is designed to allow sufficient mixing time before the water is discharged into the DAF.

All chemical storage tanks are fitted with a low level switch for auto-shutdown & to alert the operator of a low level condition; the tank levels should be checked regularly and topped up as required.



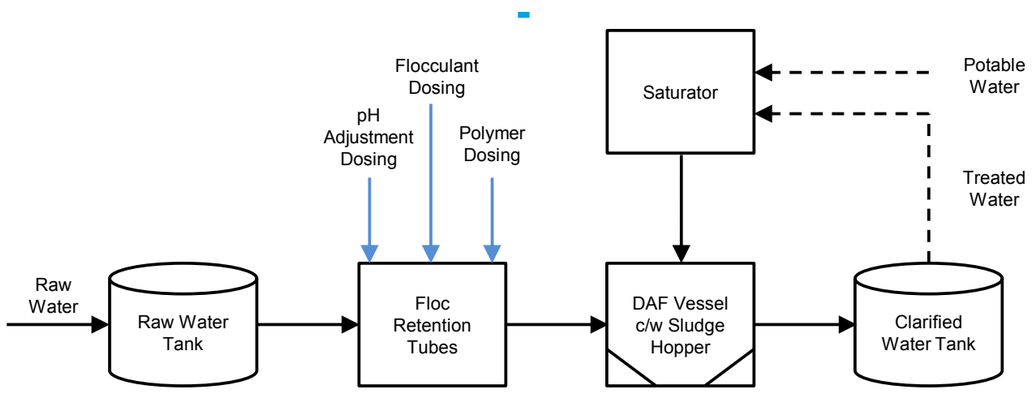
DESIGN FEATURES

DAF Clarification

The dissolved air flotation (DAF) clarification stage separates the flocculated particles (suspended solids) from the water. A pressurized stream of air-saturated water is mixed with the flocculated water and, with the release of pressure, a cloud of very fine air bubbles carries the contaminates to the tank surface.

Clean water overflows from the DAF tank, via an under-weir, to the sewer or clarified water tank for the next treatment step. The overflow level is adjustable and controls the level in the DAF flotation section.

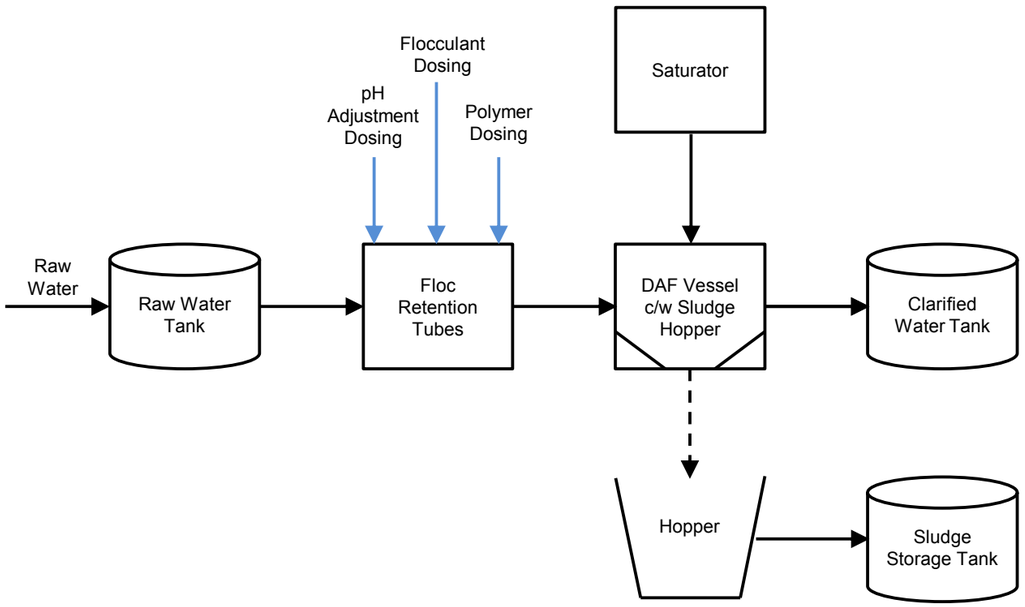
Where practical (e.g. where additional filtration is included) treated water can be used for saturator feed water, otherwise potable water is used.



Sludge Transfer Pump

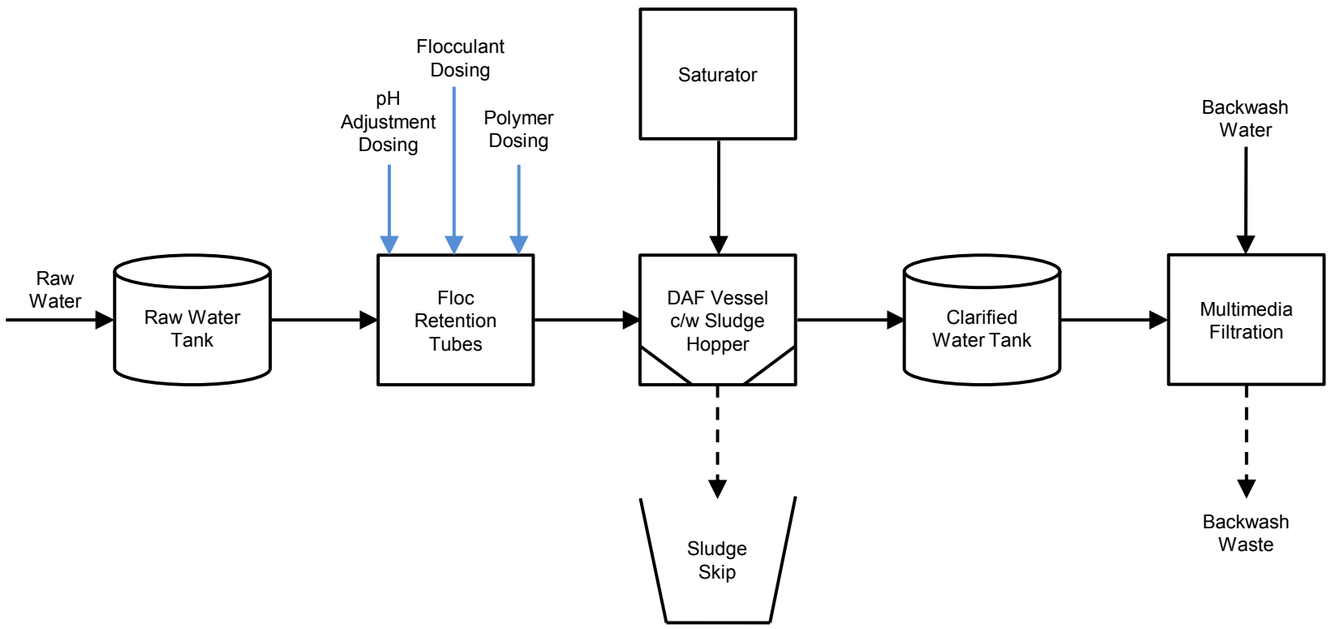
Where a sludge pump and holding tank are provided, the sludge pump transfers the waste from the hopper to the sludge tank, prior to liquid waste off site disposal.

The system is controlled by level switches that automatically switch on/off the sludge pump.



DESIGN FEATURES

Post Treatment – Media Filtration



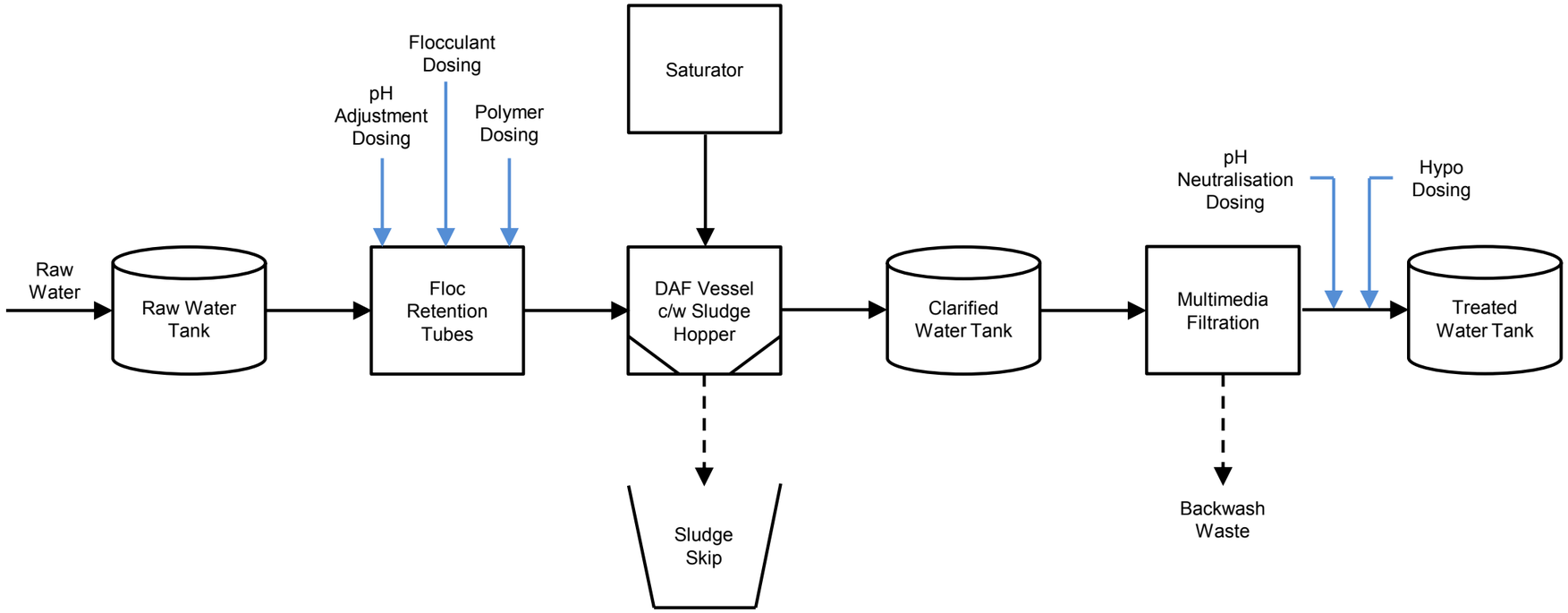
Where final effluent polishing (i.e. for recycling applications) is required, a multimedia filter can be provided.

The filter feed/ backwash pump takes flooded suction from the clarified water tank and supplies clarified water to the multimedia filter(s), which removes carried over suspended solids (20 micron or greater) from the water. The filter is periodically backwashed with potable or treated water (application dependent), based on operator adjustable time clock setting, via an electrically actuated valves.

Where remote monitoring is installed, pressure transmitters continuously monitor the differential pressure across the media filter; the filter is automatically backwashed when the differential pressure set point is triggered.

DESIGN FEATURES

Post-DAF Chemical Dosing



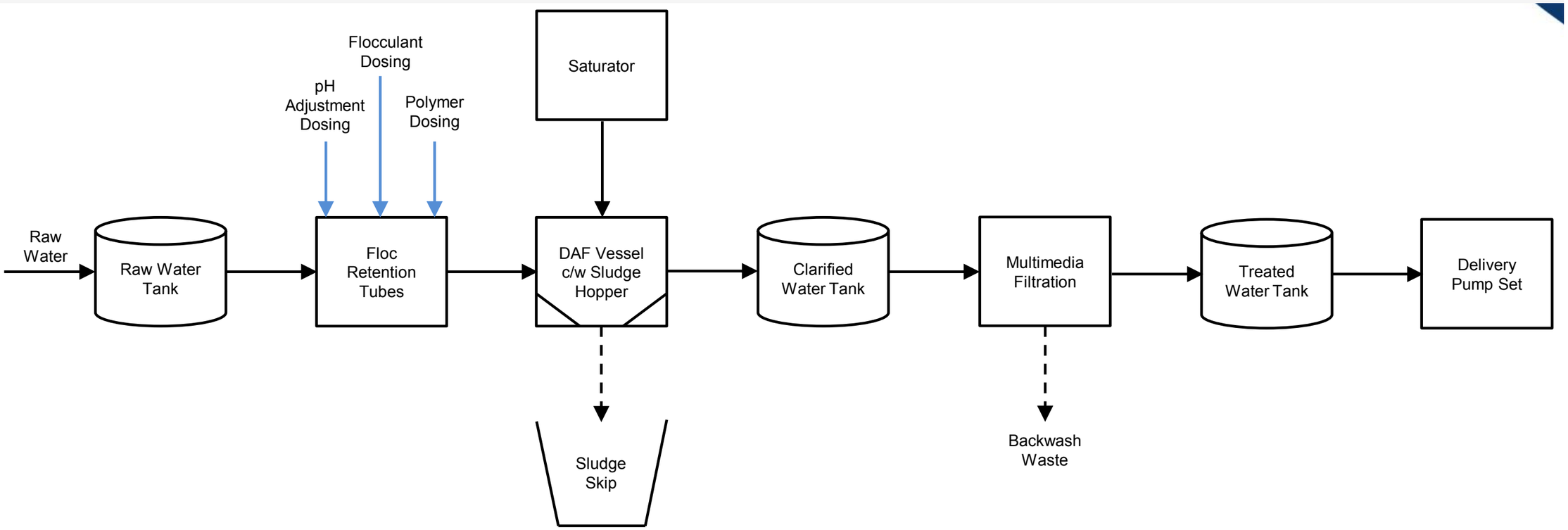
Post-DAF clarification chemical dosing systems may be added as required to suit treated water quality requirements. Typical chemicals include acid/ alkali for pH correction and sodium hypochlorite for sterilization (i.e. for recycling applications).

Depending on the application, chemical dosing rates are pre-set based on flow rate (flow paced), or automatically controlled by the PLC, based on online instrumentation (such as pH, ORP or chlorine analyzers) downstream of the dose point.

All chemical storage tanks are fitted with a low level switch for auto-shutdown & to alert the operator of a low level condition; the tank levels should be checked regularly and topped up as required.

DESIGN FEATURES

Treated Water Delivery Pump Set



A treated water delivery pump set can be provided to deliver treated water to end users.

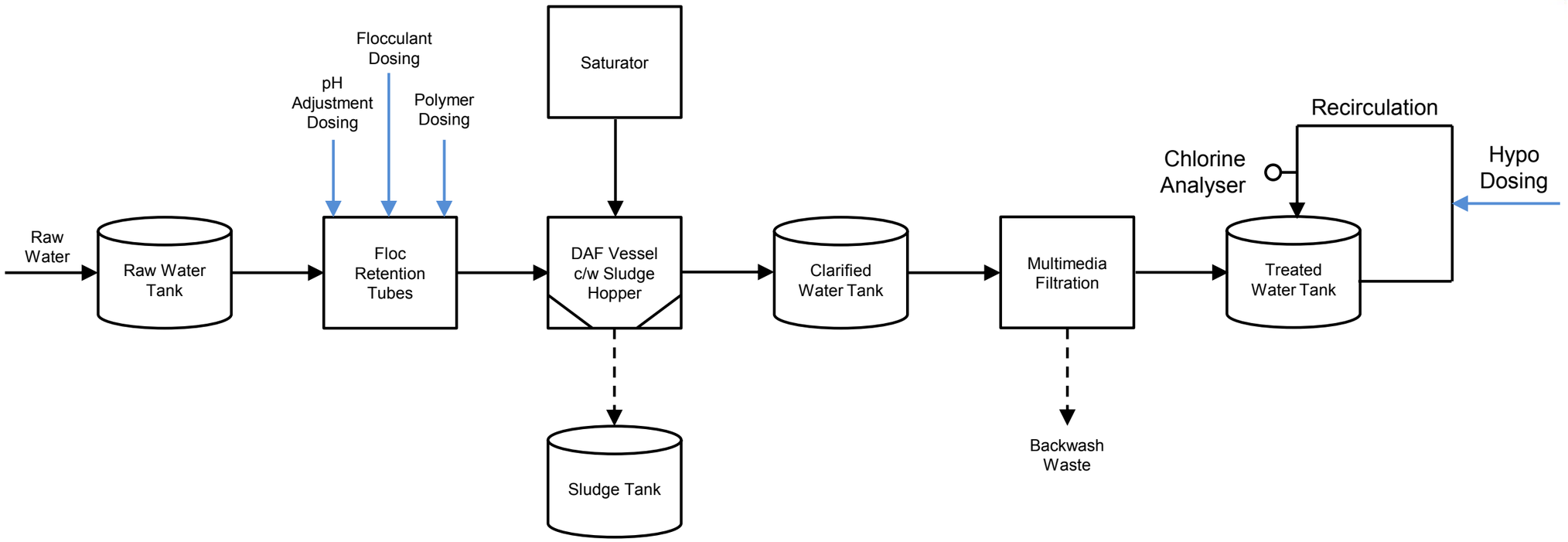
The system typically is configured as a constant pressure system, with the capability to deliver variable flow rates in response to downstream demand.

A pressure sensor is installed on the discharge manifold to automatically control the operation of the pump.

Various options are available for pumping configurations (jacking pump, standby pumps etc), and electrical controls, to suit the client’s requirements.

DESIGN FEATURES

PLC Controlled (Residual Trim) Hypochlorite Dosing, with Recirculation & Monitoring

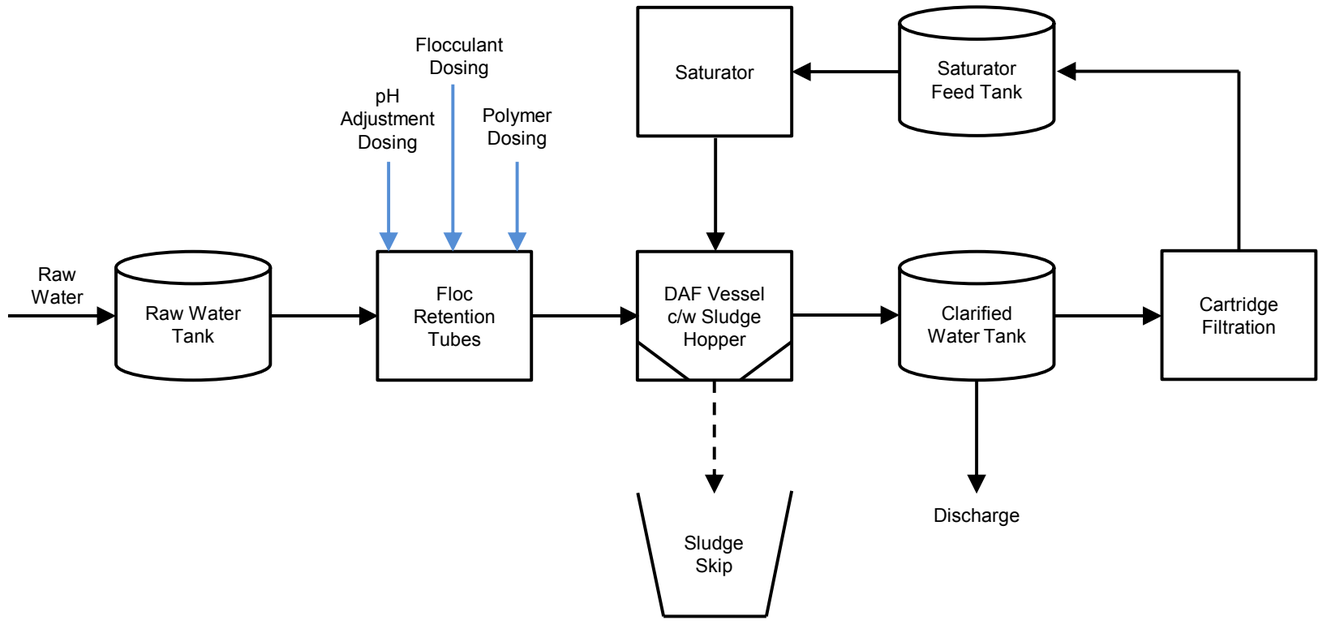


The recirculation pump circulates the contents of the treated water tank on a continuous basis; a chlorine analyzer monitors the free residual chlorine, and the PLC controls dosing of sodium hypochlorite as required to ensure correct free chlorine levels are maintained in the tank at all times. Alarms are generated by any abnormal readings.

The hypochlorite storage tank is fitted with a low level switch to alert the operator of a low level condition; the tank level should be checked regularly and topped up as required.

DESIGN FEATURES

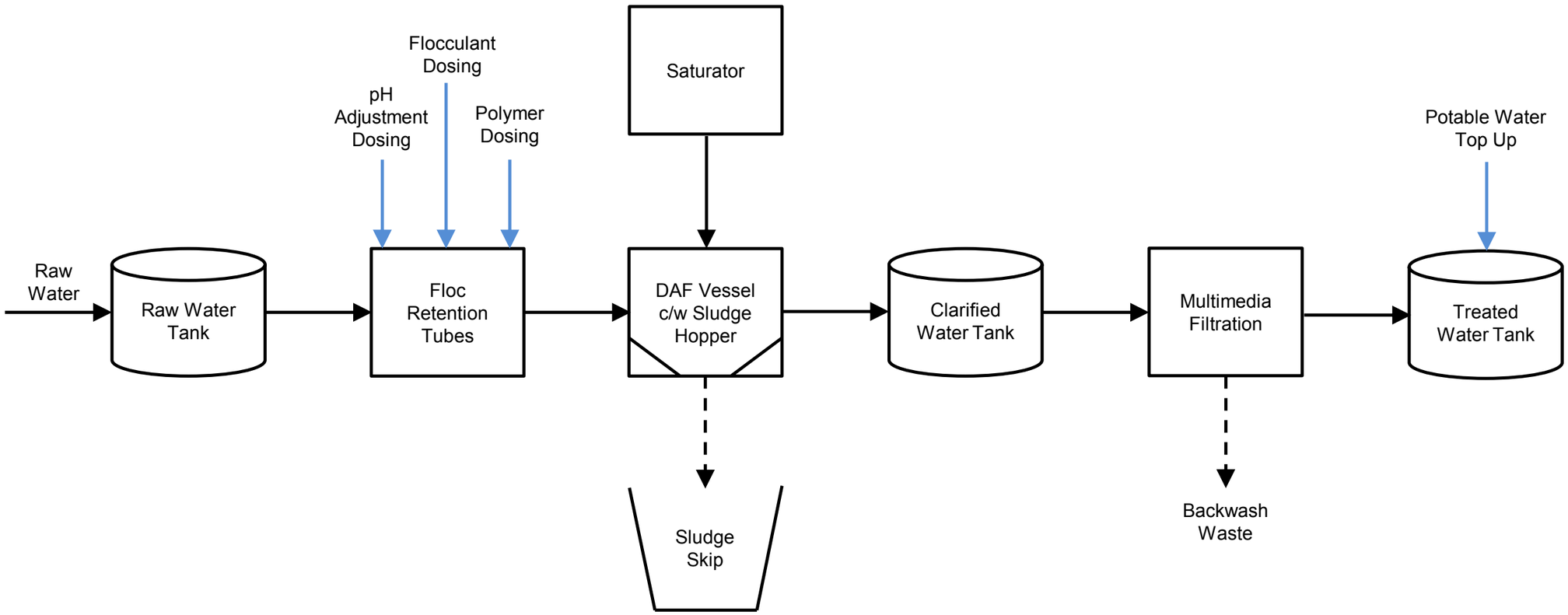
Saturator Feed Water Filtration System



Where treated water is to be re-used for saturator feed water, but there is no media filter installed, it may be necessary to filter the water prior to the saturator. The treated/ clarified water passes though cartridge filter(s) to trap any remaining sediment/ suspended solids, prior to transfer to the saturator feed tank. The cartridge filter elements are typically replaced on a monthly basis as part of routine planned maintenance procedure.

Note: This option is not required if the Multimedia Filtration option is installed.

Potable Water Top Up



Where it is possible for the treated water tank to be empty when the DAF system needs to operate, potable water top-up of the treated water tank is required.

This ensures that there is sufficient water for backwashing the multimedia filter (where installed), and re-use as saturator feed-water.

WHY CHOOSE BASIIA DAF SYSTEM?

- Offers proven performance with years of expected service
- Longer Lifespan
- Easier Maintenance and Parts Replacement
- Reliable and cost-effective
- Especially effective in removing oil and grease, total petroleum hydrocarbons, and dissolved hydrocarbons from the produced water
- Customizable dimension and nozzles sizes/ numbers to suit the client specific needs
- Consistently removes large quantities of non-emulsified organic contaminants to non-detectable levels or levels meeting regulatory codes
- Quality drive and pump components for long-term reliability
- Complete, skid-mounted design for quick, easy installation
- Rugged 304/316 SS tank design that will not flex and is corrosion resistant

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