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Dissolved Air Flotation “DAF”

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Introduction

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WATEQ has developed relationships with several manufacturers to develop a wide range of capabilities for water treatment including screening equipment, aeration equipment, tertiary treatment, package water & wastewater plants, sludge package plant, DAF units, chemical dosing systems, reverse osmosis systems, water softeners, separators, and filtration equipment.

WATEQ 's team of water treatment professionals work with out customers to determine the best solutions for the specific application based on source water quality and use of produced water.
Solutions are available for small municipal drinking water requirements as well as process water for industrial applications.

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Proposed Solution

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WATEQ is proposing DAF unit for industrial applications:

Toro Equipment - Dissolved Air Flotation System

The supply of wastewater equipment manufactured by Toro Equipment ("Toro"). Toro Equipment is a leading European company specialized in the design and manufacture of equipment for industrial and urban wastewater treatment, water processing, water reuse and sludge treatment. The company has been manufacturing solutions for industry for over twenty-five years and was recently awarded the "Higher Technical Novelty" award which recognizes the most innovative and prestigious companies participating in the 2017 International Water and Irrigation Exhibition. The award recognizes the most innovative company in the interest of improving technologies applied to water treatment.

The equipment to be supplied is manufactured to the ISO 9001:2008 quality standard. All required Canadian certifications for pressure vessels, electrical components, and pump motors are included in the price. Toro currently has a number of installations in Canada for various applications and detailed references are available upon request.

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The proposed system will require installation including piping of raw water from the new raw water pumps to the DAF Units inlet, piping discharge from the DAF unit's outlet to the discharge sewer, and piping of sludge from the DAF unit's sludge holding tank to the new sludge holding tanks, all motors and instruments wiring to the main control panel and all dosing pumps piping and connections. All installation will be completed by the contractor and is not included in the price of this proposal.
The proposed equipment includes a twenty-four (24) months manufacturer's warranty. During the warranty period, the manufacturer will provide any required parts in the event of any deficiencies. WATEQ 's team will be available to provide any onsite support. WATEQ technicians are trained and supported by the manufacturer's technical team.

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Unit Description

Main parts of flotation unit:
The DAF flotation tank (1), is designed to allow for optimization of the following characteristics:
* Hydraulic retention time
* Surface/solids loading rates
* Volume loading

The DAF unit is divided into inlet section, flotation zone and sedimentation zone, including a trough for floated and scraped scum withdrawal and outlet. The following description relates to the image overleaf. The Scraper Mechanism wipes the floated scum from the flotation tank surface into the offtake trough. The plastic skimmers are screwed to the steel brackets and are fastened to plastic chains. The skimmer position against the chain is given by plastic rings which are fixed by shaped washers and stirrup rings. The chains are stretched between plastic chain-wheels embedded into bearing bodies through the primary and driven shaft. To facilitate the chain movements they are led through removable plastic guides. The unit is driven by an electrical gearbox, with torque transmitted via lever and rubber block. The Recirculation Circuit recycles a proportion of the flotation tank contents thus returning effluent saturated with air back to the inlet section. The circuit consists of recirculation pump(s), suction pipe discharge pipe. A check valve and ball valve are incorporated into the discharge pipe to provide unidirectional flow and isolation. The discharge pipework also contains a pressure vessel fitted with a pressure gauge and a compressed air connection to a ball valve allowing blow off, or purge of excess air via a rubber hose.

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Unit Description

Distribution hoses distribute recirculated and aerated water back to the front end of the flotation tank zone. The Air Circuit supplies air at the required flow and pressure to the discharge side of the recirculation pump. It consists of an inlet rubber hose connected to the pressurized air source (a compressor), solenoid valve, pressure regulator, rotameter and an air check valve. (Optional) built-in Laminated Blocks seated inside the flotation tank optimize the sedimentation process and separate the flotation and sedimentation zones.

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Scope of Supply

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Scope of Supply

The following items are provided with the system:

- Inlet primary oil and grease Skimmer:
  Skimmer, Model 8, with 8" wide x 18' long (measured from the center of the head pulley to the center of the tail pulley) Indoor Polymer belt material, Hybrid Ceramic wipers, standard carbon steel head pulley and tail pulley with protective cage, yoke, and tether. Automatic-Off vertical Float. Switch for oil collection drum or tote, 110V single-phase, TEFC motor.

- Influent raw water pumps:
  Wilden Pro-Flo SHIFT PS15 Original Series, pumping from existing waste pit to new wastewater treatment equipment; Inlet/ Discharge 76 mm (3"), Max Discharge Pressure: 8.6 bar (125 psig) Max Solids Size: 9.5 mm (3/8”) Max Suction Lift: 8.6 m (28.4') Dry, 6.6 m (21.6') Wet, Max Flow: 927 lpm (245 gpm).

- Flow Meter
  Flow meter for discharge water, manufacturer to be ABB, model FEW with a remote transmitter, FEW325 - WaterMaster FEW325 Electromagnetic Flowmeter system, full bore, DN 200 (8 in.), remote mount.

- Chemical Dosing system:
  Caustic and Flocculant Dosing Pump- Watson Marlow Qdos120 Universal+ 24V Logic Peristaltic Metering Pump
  Coagulant Dosing Pump- Watson Marlow Qdos60 Universal+ 24V Logic Peristaltic Metering Pump.
  Discharge Pressure: 60 psig, Power Requirement: 120 VAC, Control: 4 to 20mA
  Including Tanks and agitator.

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Scope of Supply

- Equalization Tank GRP or FRP 40 m3, Above -Ground HORIZONTAL
- Oil Holding Tank GRP or FRP 20 m3

Dissolved Air Flotation System:

- Flocculation Pipe

  Flocculation pipe is hydraulic flocculation that use the energy of the wastewater flow to mix the wastewater with chemicals, encouraging coagulation and flocculation. Floc tubes are commonly used prior to dissolved air flotation (DAF) systems. The floc tube is constructed from PVC or CPVC pipe, with each unit having a pipe of two different sizes to improve performance over a wider range of flows. The larger of the two pipe sizes are used in the straight pipe runs to provide gentle mixing and increase the hydraulic retention time. The turns are constructed using the smaller pipe size to increase mixing and back mixing.

- Dissolved Air Flotation Unit

  (DAF) is a water treatment process that clarifies wastewater (or other water) by the removal of suspended matter such as oil or solids. The removal is achieved by dissolving air in the water or wastewater under pressure and then releasing the air at atmospheric pressure in a flotation tank basin. The released air forms tiny bubbles which adhere to the suspended matter causing the suspended matter to float to the surface of the water where it may then be removed by a skimming device. Dissolved air flotation is very widely used in treating the industrial wastewater effluents from oil refineries, petrochemical and chemical plants, natural gas processing plants, paper mills, general water treatment and similar industrial facilities. The proposed equipment is manufactured under ISO 9001:2008 quality assurance standards. WATEQ is recommending a new a 5.7 m3/hr unit to be used.

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Scope of Supply

- Electrical Control Panel
  The DAF shall be PLC controlled with a color touchscreen interface including graphics, text, and the ability for the operator to change the required parameters for maximum efficiency. The control panel shall be designed to protect all field equipment and allow for individual equipment electrical isolation. The control panel shall include the ability to automatically send out alarms to the required personnel such as maintenance. It shall also have the ability to send out reports to the required personnel. WATEQ is proposing an Allen Bradley PLC which will be supplied with required CSA certification.

- Online Instruments:
  Inlet and outlet turbidity sensor
  Inlet and outlet oil & grease (animal/vegetable/mineral) sensor
  Inlet and outlet pH & ORP sensor
  Main waste water reservoir Ultrasonic Level Transmitter
  Automatically activated fail-safe bypass valve

- 12-month sampling and reporting:
  1 year of water effluent quality sampling and reporting at the frequency of every month.

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Service & Warranty

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Service

WATEQ employs several experienced Engineers, Field Technicians, Journeymen Electricians and Automation Technicians with significant experience in water and wastewater field operations. These service personnel is primarily based out of locations in Hamilton- Ontario.

WATEQ Technicians are on call 24 hours per day, seven days per week, to respond to telephone inquiries regarding general operation and maintenance, interpretation and clearing of alarms, and other questions that may arise. Depending on control system configuration and capability, WATEQ 's personnel can access the system remotely to assist the operator with troubleshooting. Additional on-site assistance can be provided, as required, by WATEQ Technicians. WATEQ will provide the appropriately qualified service technician on site within 48 hours. For unplanned emergency service, both locations can provide a qualified service technician on site within 48 hours.

Routine spare parts such as O-Ring, Seals, Membranes, Filters, Chemical Pump Rebuild Kits, Smaller Gauges and Valves, Chemicals, and other expendables are stocked at our venders' locations. These can be shipped same day via courier.

Warranty

WATEQ Equipment is guaranteed for a period of two (2) years after the preliminary acceptance of the work by the Owner." Our standard equipment warranty will remain in effect for twenty-four (24) months, commencing on the date the system is put into operation after the completion of commissioning activities.

If WATEQ cannot repair a fault, it will replace any required components expeditiously. The Equipment Warranty stated above is exclusive of extended power outages or exceptional changes to the raw water or raw water pump system. The Equipment Warranty is also subject to the proper care, operation, and maintenance of the equipment by site personnel.

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Maintenance

The DAF unit is a reliable and robust process which requires the standard form of maintenance and good housekeeping. Firstly, operators should carry out daily visual inspections of all hydraulic, pneumatic and chemical pipe work connections.

The following DAF unit maintenance recommendations:

- To prevent sludge build-up and poor microbubble formation, the DAF unit should be periodically drained and cleaned.

- pH probes should be calibrated monthly and cleaned weekly as a minimum.

- On a biweekly basis, the operation of the recirculation circuit should be inspected. Effectively, the clarity of the liquid passing through all isolation valves in the pressure vessel, hoses and valves in the flotation tank must be observed. This check should be carried out during the normal operation of the DAF unit, consecutively for every single hose:

➢ Close both valves associated with the hose being checked and release one of the hose ends..
➢ Open the valve and check it and the hose for water clarity (water should be drawn into a suitable container).
➢ Open the other valve and check the water for its clarity.

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Maintenance

- Carry out the above operation with all the valves and hoses in the recirculation circuit. In case any of the valves and/or hoses get frequently blocked, the pressure vessel must be removed and cleaned out. The removal operation should be carried out by the manufacturer or representative agent.
- Three times a day or as required, open the inlet section de-sludge valve (for 30s).
- On a weekly basis, drain the flotation tank down to the inlet pipework level and rinse the sockets and nozzles by pressure washer (hot water is recommended if available).
- On a biweekly basis, before the DAF is shut down for more than three days, the whole flotation tank should be drained down (ensure slow drainage so as not to flood the sludge tank). Empty by tanker the sludge storage tank before this operation is carried out to ensure that sludge is not washed back to the balance tank. The flotation tank must be rinse cleaned and inflow socket interiors washed with warm water. It must be made sure that the water temperature does not damage the built-in laminated blocks (if fitted). When servicing the recirculation pumps follow the manufacturer's instructions. Copies of service and maintenance instructions are included with the DAF unit documentation

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Standard Delivery Terms

- Installation Drawings (to be signed off by customer) 1-2 weeks
- Manufacturing 10-12 weeks
- Shipping 4-5 weeks
- Installation 1-2 weeks
- Testing and Commissioning (included) 1 week.
- Shipping terms: DDP up to the plant

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Why WATEQ ?

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Why WATEQ ?

Our purpose is to help you make people safe.

Dedicated Account Manager trained to assess your needs supported by the entire WATEQ team.

One stop shop for subject matter experts, products, repairs, service, commissioning and training.

We work in the field just like the people who use our equipment.

WATEQ team has over 15 years experience, providing unique solutions to our many customers, both big and small; from large industrial/municipal projects in Canada.

WATEQ partner's proprietary technologies are readily installed as either standalone systems for a total solution or as a customized upgrade that can be integrated into existing conventional systems.

Our systems also have the flexibility to be installed as modules, gradually increasing the system capacity to meet the changing demands of a growing community with increasing regulatory control on wastewater management, the ability to augment existing systems to meet tighter environmental standards whilst avoiding extensive capital outlay is critical in today's competitive world.

The environment is about quality... a principle that permeates through all of the technologies, equipment, products and services provided by WATEQ .

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