

ENVIRONMENTAL
TREATMENT
SYSTEMS, INC.
ETS



Dissolved Air Flotation (DAF)



The DAF Process

Dissolved air flotation (DAF) is a proven and effective physical/chemical technology for treating a variety of industrial process and wastewater streams, including those from food processors, laundry facilities, pulp and paper producers, and biological wastewater treatment systems.

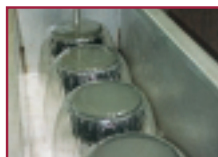
The ETS RT Series DAF systems are designed to remove suspended solids (TSS), biochemical oxygen demand (BOD₅), and oils and greases (O&G) from a wastewater stream. Contaminants are removed through the use of a dissolved air-in-water solution produced by injecting air under pressure into a recycle stream of clarified DAF effluent. This recycle stream is then combined and mixed with incoming wastewater in an internal contact chamber where the dissolved air comes out of solution in the form of very fine bubbles that attach to the contaminants. The bubbles and contaminants rise to the surface and form a floating bed of material that is removed by a surface skimmer into an internal hopper for further handling.



Timer-operated, variable-speed drive allows fine tuning of top skimmer operation to match float production



Concurrent, flight and chain top skimmer system allows for longer float residence time, resulting in the driest materials possible



Oversized, adjustable effluent weir rings provide easy adjustment of water level and prevents fluctuations from flow surges



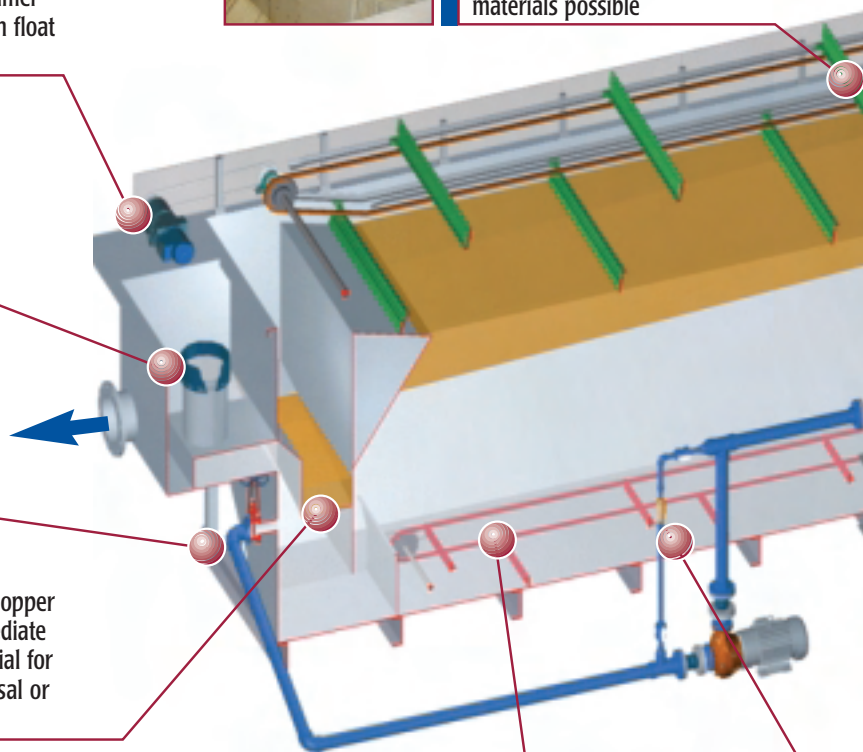
Compact, heavy-duty design allows for simple installation and easy cleaning around the unit



Oversized float hopper provides intermediate storage of material for transfer to disposal or dewatering



Counter-current, flight and chain bottom skimmer system provides for the removal of settled solids without bridging problems (optional auger system available)



Why Use an RT Series DAF?

ETS developed the RT Series of packaged DAF systems over fifteen years of basic research and multiple installations in a variety of industries. These systems provide basic features not found with other DAF systems:

- ▶ Eleven (11) different units to meet a variety of applications and flow ranges (10 to 2,500 gpm)
- ▶ Skid-mounted design for ease of installation and rapid start-up
- ▶ Rectangular profile for maximum space utilization
- ▶ Simple, effective controls and operation
- ▶ Quality drive and pump components for long-term reliability
- ▶ Multi-step quality control program
- ▶ Full construction and component warranties
- ▶ Complete start-up and training
- ▶ Process design assistance
- ▶ Expert technical support before and after installation

Innovative contact chamber that features multiple recycle injection ports and a mid-tank injection system to improve bubble-to-contaminant contact. An adjustable weir provides even flow distribution through the unit



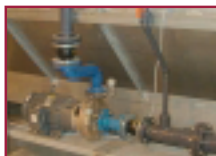
Recycle pressurization and air supply controls are simple to use



High efficiency, air-in-water solution (whitewater) system, featuring the Hellbender® DAF Pump, to provide true dissolved air with high concentrations of fine bubbles.



Innovative air induction system produces dissolved air without a compressed air supply

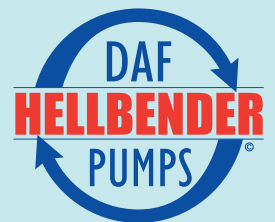


RT Series Specification Data

DAF Model	Surface Area (ft ²)	Length (ft)	Width (ft)	Height (ft)
RT-15	14	9'-5"	3'-3"	5'-2"
RT-30	31	11'-7"	5'-3"	6'-10"
RT-50	57	13'-10"	7'-2"	7'-1"
RT-70	74	16'-10"	7'-2"	7'-1"
RT-100	98	17'-6"	9'-4"	8'-1"
RT-140	143	23'-6"	9'-4"	8'-1"
RT-160	159	26'-6"	9'-4"	8'-1"
RT-180	181	24'-7"	11'-3"	9'-8"
RT-240	238	30'-7"	11'-3"	9'-8"
RT-350	384	30'-6"	12'-4"	9'-8"
RT-500	480	47'-9"	12'-4"	9'-8"

HOW IS THE HELLBENDER® DAF PUMP DIFFERENT FROM A REGULAR CENTRIFUGAL PUMP?

- ▶ Specially designed to operate at high (>100 psi) pressures and pump water with entrained air *without* cavitating
- ▶ Higher air dissolving efficiency vs. standard centrifugal pumps due to high pressure and unique design
- ▶ Hellbender® DAF Pumps are distributed worldwide by ETS



Flocculation Systems

ETS provides high-efficiency Flocculation Systems for installation prior to DAF:

Flocculation Tubes

A simple, low-energy means of introducing coagulating and flocculating chemicals into a waste stream prior to flotation. The systems feature serpentine, corrosion resistant piping with non-clogging mixing zones for optimum mixing of chemicals. The systems are mounted in heavy-duty, galvanized steel frames for long service life.

Flash Mix and Flocculation Tank Systems

For applications that have more complicated chemistries, such as pH control, ETS provides Flash Mix and Flocculation Tank Systems for the introduction of coagulating and flocculating chemicals into a waste stream. The tanks are sized to match the flow requirements of the DAF and come in FRP, HDPE, or 304SS construction. The systems feature Hellbender® Mixers with heavy-duty drive motors and stainless steel shafts and turbines.



Turn-Key Systems

ETS will provide DAF systems and related components either on a component basis or as a complete turn-key installation. ETS process engineers will work with consulting engineers or directly with a client to develop a treatment process and provide and install all of the components necessary for a complete system. Turn-key systems have the advantage of providing a client with a single source of supply and accountability.



Treatability Testing

ETS has a comprehensive laboratory testing program to evaluate a waste stream for dissolved air flotation. Portable pilot systems are available to replicate actual process conditions and provide detailed design and operational information for use in the design of a full-scale pretreatment system.

About ETS

Environmental Treatment Systems, Inc. is a full-service environmental company that has been providing engineered solutions to industrial wastewater problems since 1987. Other treatment systems from ETS include:

- ▶▶ Hellbender® DAF Pumps
- ▶▶ Hellbender® Mixing Systems
- ▶▶ SepaFloat® solids removals systems
- ▶▶ PABR® anaerobic systems
- ▶▶ ETSBR® aerobic systems
- ▶▶ Polymer feed systems
- ▶▶ Sludge dewatering systems
- ▶▶ pH control systems

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