
APPENDIX C.2

IFAS



AnoxKaldnes™

Moving Bed Biofilm Reactor (MBBR)

Integrated Fixed-Film Activated Sludge (IFAS)

and ANITA™ Mox Deammonification

WATER TECHNOLOGIES

AnoxKaldnes™ MBBR and Hybas™ Processes

AnoxKaldnes™

is the global leader in MBBR and IFAS technologies. Veolia provides the most advanced MBBR and IFAS technologies supported by more expertise and with more installations (600+) than any other MBBR and IFAS system provider.

AnoxKaldnes™ MBBR

(Moving Bed Biofilm Reactor) is a biological wastewater treatment process that utilizes specialized polyethylene carriers (media) to create a large protected surface on which biofilm can attach. The media is mixed in the reactor, and the large surface area provides more treatment capacity in a smaller volume compared to activated sludge.

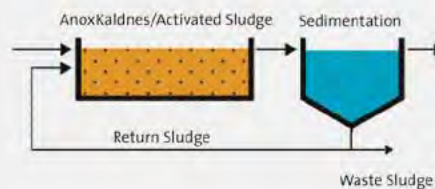
AnoxKaldnes Hybas™

(Hybrid Biofilm Activated Sludge) technology is an application of the IFAS process in which moving media is mixed into an activated sludge environment. The result is both fixed-film and suspended growth biomass working together and lending the strengths of each to the hybrid process. The Hybas process is excellent for retrofitting existing activated sludge plants to improve ammonia and nitrogen removal.

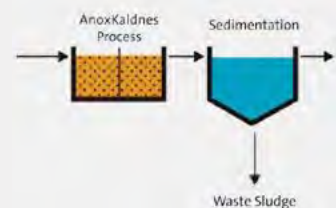
Advantages

- Simple and reliable operation
- Excellent for ammonia and total nitrogen limits ($\text{NH}_3\text{-N} < 1 \text{ mg/L}$, $\text{NO}_3\text{-N} < 1 \text{ mg/L}$)
- Smaller footprint than activated sludge
- Increase plant capacity for nitrification and/or denitrification
- Effective in cold water
- Accommodates a wide range of flow and load fluctuations
- Non-clogging media with a long lifespan
- Flexible design for almost any tank configuration

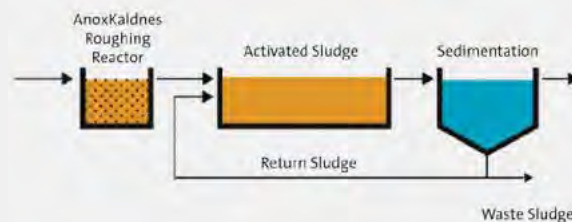
Hybas™ Technology



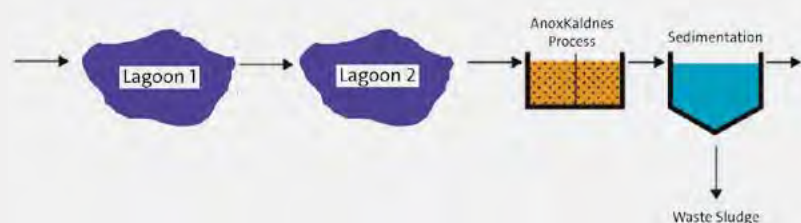
MBBR



Biofilm Activated Sludge



LagoonGuard® MBBR



Air Grids and Media Retention Screens



Aerobic Applications

- AnoxKaldnes stainless steel air diffuser system is robust, non-clogging and maintenance free
- Diffusers provide oxygen for process needs and media mixing for optimal biological performance
- Cylindrical screens at reactor's effluent wall retain media while allowing treated water and suspended solids to pass through

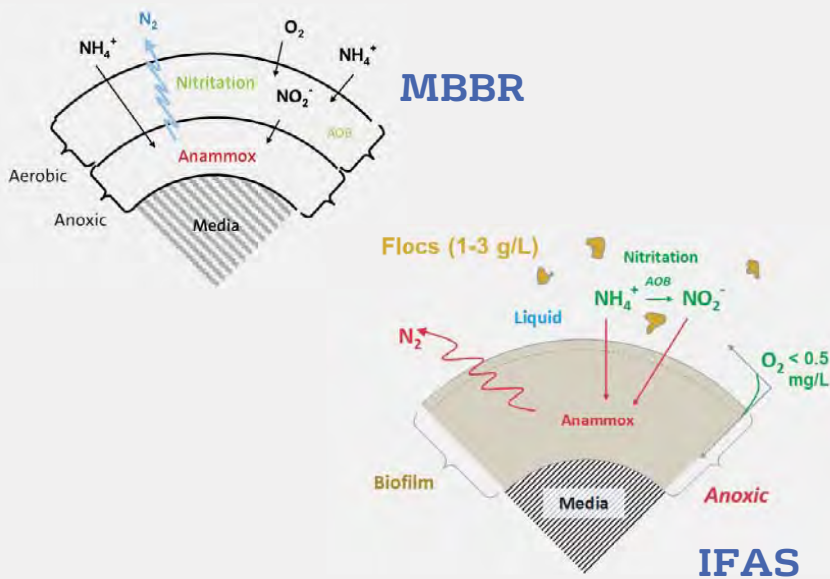
Mixers and Flat Screens



Anoxic Applications

- AnoxKaldnes stainless steel air diffuser system is robust, non-clogging and maintenance free
- Diffusers provide oxygen for process needs and media mixing for optimal biological performance
- Flat screens at reactor's effluent wall retain media while allowing treated water and suspended solids to pass through

ANITA™ Mox Deammonification



System Supplier Scope of Supply

- Complete process design with effluent guarantees and performance bonds
- Process equipment including media, screens, air grids, blowers, pumps, mixers and valves
- Field Instruments and process control
- Customized SCADA for the highest level of operations monitoring and control

The ANITA Mox process combines aerobic nitrification and anammox reactions simultaneously in a single reactor. With MBBR, the reactions take place in different layers of biofilm on the AnoxKaldnes media. With IFAS ANITA Mox, most of the nitrification reaction occurs in the suspended biomass, while the anammox reaction takes place on the carrier media. The MBBR and IFAS ANITA Mox platforms both provide a robust, stable process with simple operation, energy and chemical savings, and efficient ammonia removal.

AnoxKaldnes Technology Can Benefit A Wide Range of Plant Sizes



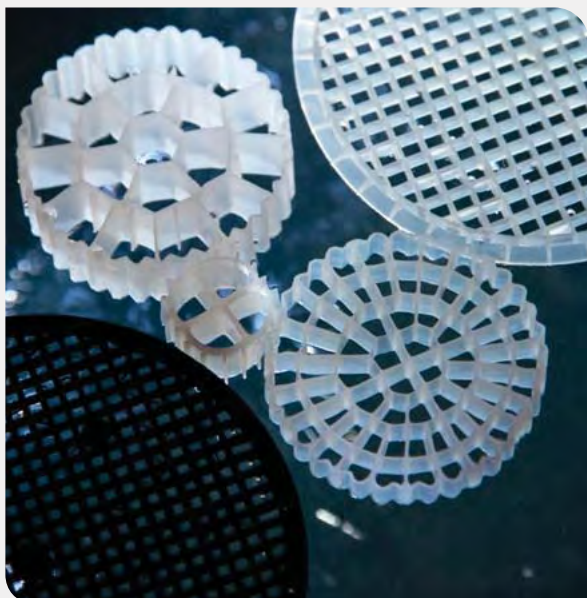
Cheyenne, WY ***AnoxKaldnes MBBR***

- In 2005, MBBR replaced trickling filters and was chosen because it is a biofilm process that is compatible with the existing clarifiers.
- Consists of two trains of two pre-anoxic and four aerobic reactors in series to treat 6.5 MGD and achieve BOD <10 mg/L and ammonia <2 mg/L, NO_x-N <9 mg/L.



Providence, RI ***AnoxKaldnes Hybas Technology***

- Ten parallel process trains with a treatment capacity of 77 MGD
- Existing aeration basins converted to a 4 stage process with one IFAS zone per train
- Pre-anoxic stage for denitrification using the influent BOD as a carbon source
- Aerobic Nitrification stage for BOD and Nitrification – IFAS Zone. 52% fill using AnoxKaldnes K3 media type. Total media surface area of 36.3 million square feet
- Post-anoxic stage for additional denitrification using an external carbon source
- Clarification stage for solids separation and collection



Winning Combinations

- *High rate clarification with ACTIFLO®*
- *Primary clarification with MULTIFLO*
- *Filtration with Hydrotech Discfilter*

South Adams County, CO

About Entex

Entex offers an unequalled selection of advanced wastewater treatment solutions. Our solutions effectively address space constraints and budget concerns, as well as ever increasing demands for higher quality effluent and increased plant capacity. Technologies provided by Entex have been selected with confidence to treat more than 60 million gallons per day of design capacity.

Entex provides biological systems for carbon and nutrient removal, including phosphorus and nitrogen control. As a provider of both fixed media (BioWeb) and moving media (BioPortz) processes, Entex offers an unbiased design assessment. The Entex team has been involved in over 750 installations with over a combined 100 years of experience. Additionally, Entex offers a flexible suite of tertiary filtration systems that have been Title 22 approved by the State of California for reuse quality effluent. Entex's filtration systems are designed to further polish final effluent and reduce turbidity for reuse and irrigation purposes.

Entex provides the ability to upgrade treatment facilities to meet the needs of increased capacity and improved effluent discharge requirements, often without the need for additional treatment basins. These systems provide powerful solutions to the challenges facing wastewater treatment systems, offering extraordinary levels of performance typically at a substantially lower cost than conventional solutions.



About **ENTEX**

<u>Systems</u>	<u>Industries</u>	<u>Solutions</u>
• SBRs • Lagoons • BNR/ENR • Activated Sludge • Oxidation Ditches	• Oil and Gas • Pulp and Paper • Landfill leachate • Food and Beverage • Chemical/Petrochem	• Webitat™ fixed media • BioPortz™ moving media • FlowTex™ Filtration • Packaged Plants • Peak Managed Services



About BioWeb™

Entex's BioWeb is a patented, high strength (+1,000 lbs), lock-knit polyester textile designed to enhance and stabilize microorganism colonization within biological wastewater treatment applications. By introducing a protected surface, microorganisms are allowed to immobilize and increase in concentration, thereby increasing the ability to degrade wastewater constituents and nutrients. Individual filaments form small ½-inch loops that extend from the textile, providing growth sites for biomass. Since the material is lock-knit, it will not unravel and will not dislodge during operation. Each BioWeb row is secured to a horizontal cross member at the top and bottom of the frame, ensuring the BioWeb will remain intact. Additionally, BioWeb is installed in a continuous sheet with 4-inches between vertical rows to allow a greater open area to reduce hydraulic drag. Flow is typically directed parallel to the vertical rows.



Intro to BioWeb Fixed Media

BioWeb fixed-media

- Lock-knit polyester (will not unravel)
- 16+ years in industry
- 1,000+ lbs break strength
- Optimized design for scour
- 30+ years projected lifespan

Frames

- Complete welded 304L SS
- Integrated scour aeration
- Custom engineered solutions

Installation

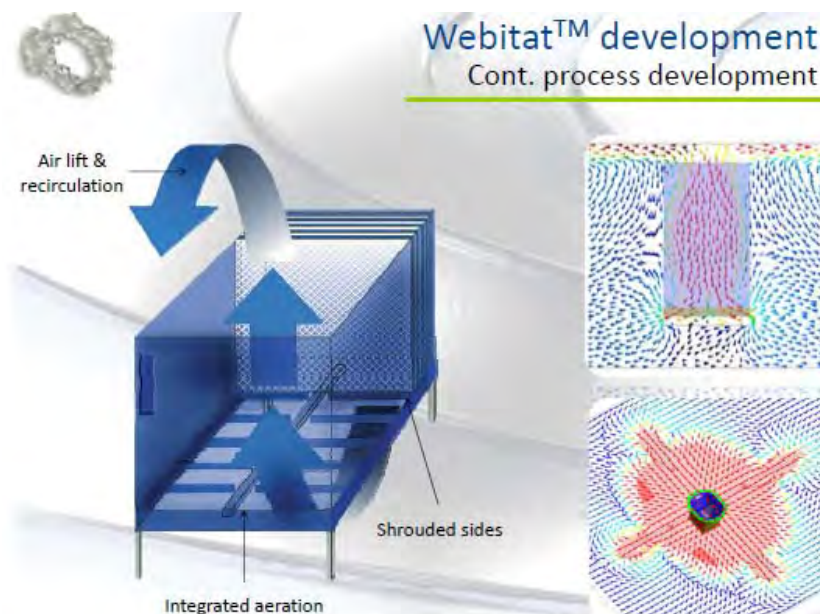
- Modules delivered fully assembled
- No onsite frame assembly required





About Webitat™

Entex's Webitat process utilizes BioWeb media and allows a proactive control of the attached biofilm thickness by incorporating an integrated aeration mechanism below each Webitat frame. This dedicated aeration ensures a high rate of shear and serves to create an air lift effect, enabling continuous circulation of influent substrate. As a result, substrate transfer and diffusion rates can be optimized. Each Webitat is shrouded to confine and direct the integrated aeration into the BioWeb media, increasing scour efficiency. The integral aeration flux rate can be controlled via dedicated Webitat process valving to provide proactive operation and process control. The enclosed Webitat module operates as its own high-rate biological reactor, enhancing mixing and biomass inventory. By regulating Webitat aeration, performance can be optimized to meet plant specific needs.



- Baseplate, for lagoon applications

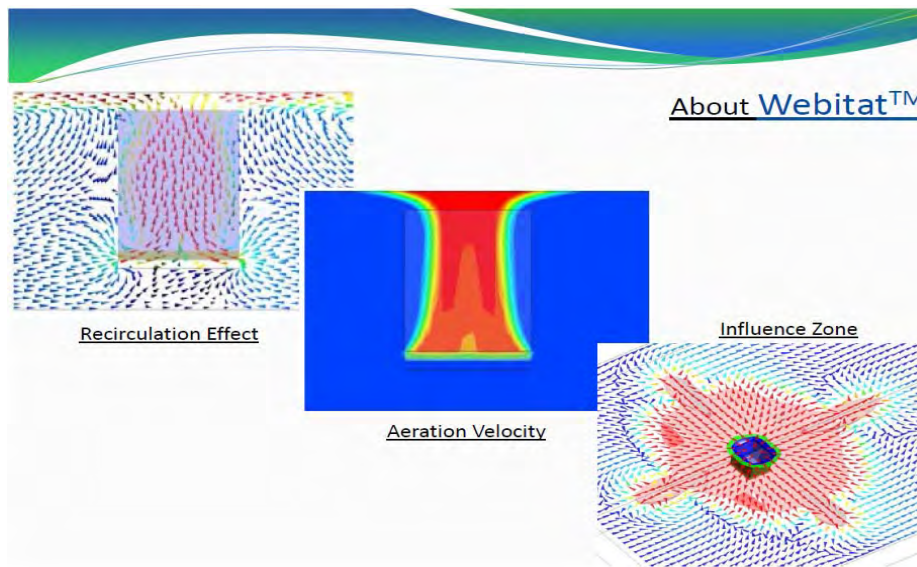
- Shrouded sides confine aeration pattern and create air lift pump, substrate is drawn into Webitat unit



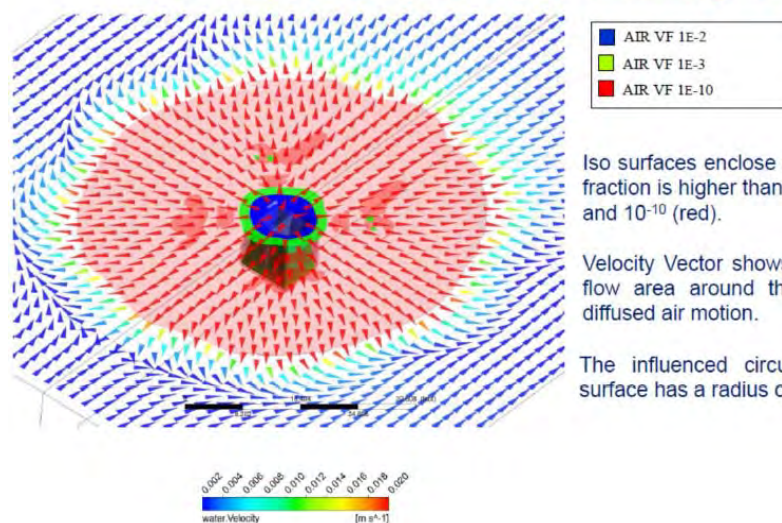
- Integral aeration

About Webitat cont...

Each Webitat module can be programmed to operate independent of other Webitat modules to allow additional process flexibility, aeration adjustment and mixing control. When operated in activated sludge systems, the Webitat aeration process minimizes bypass potential and forces substrate to be recirculated continuously. Complex CFD analysis has been performed to demonstrate the recirculation effects and mixing intensity of the Webitat aeration (see below). Under normal aeration rates, Webitat modules can recirculate in excess of 4 MGD per module and can impact liquid movement to negate bypass. This ensures conventional processes are well mixed.



Iso surfaces plot and velocity vectors

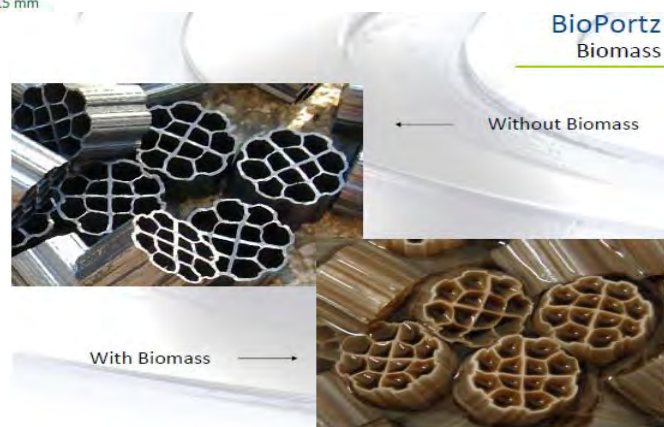


About BioPortz

BioPortz is a high density polyethylene (HDPE) extruded media designed to enhance and stabilize microorganism colonization within biological wastewater treatment applications. By introducing a protected surface, microorganisms are allowed to immobilize and increase in concentration, thereby increasing the ability to degrade wastewater constituents. Independently moving BioPortz carriers continually circulate through the treatment basin in a random motion, ensuring excellent oxygen and substrate transfer to the biomass. Because little or no additional tankage is typically required, BioPortz offers an effective solution for plants with limited room for expansion. Additionally, it is also an excellent solution for space efficient, high performance new treatment basins.

BioPortz moving media provides $589 \text{ m}^2/\text{m}^3$ of protected biological surface area for biomass growth. The attached biomass populations can more than double the effective MLSS concentration. The vigorous motion of the media through the basin provides a high shear, creating higher biological kinetics.

BioPortz media is approximately 18mm in diameter and 15 mm in cylinder length. This allows for a more open effluent media retention screen design, minimizing head loss and plugging or blinding potential. Entex's design incorporates a 10-mm slot width. Inlet screening is thereby less stringent and can be as large as 6-mm.



Resourcing the world

Veolia Water Technologies

Kruger Inc. / 4001 Weston Parkway / Cary, NC 27513

Phone: 919.677.8310 • Fax: 919.677.0082

krugerincmarketing@veoliawater.com • www.krugerusa.com

APPENDIX C.4
FINE SCREEN

Lakeside's *RAPTOR*® Micro Strainer

**Ideal for small
treatment plants**



- Removes solids that pass through other screens
- Single operational unit screens, compacts and dewateres
- Minimizes maintenance costs

Innovative Screening Solutions

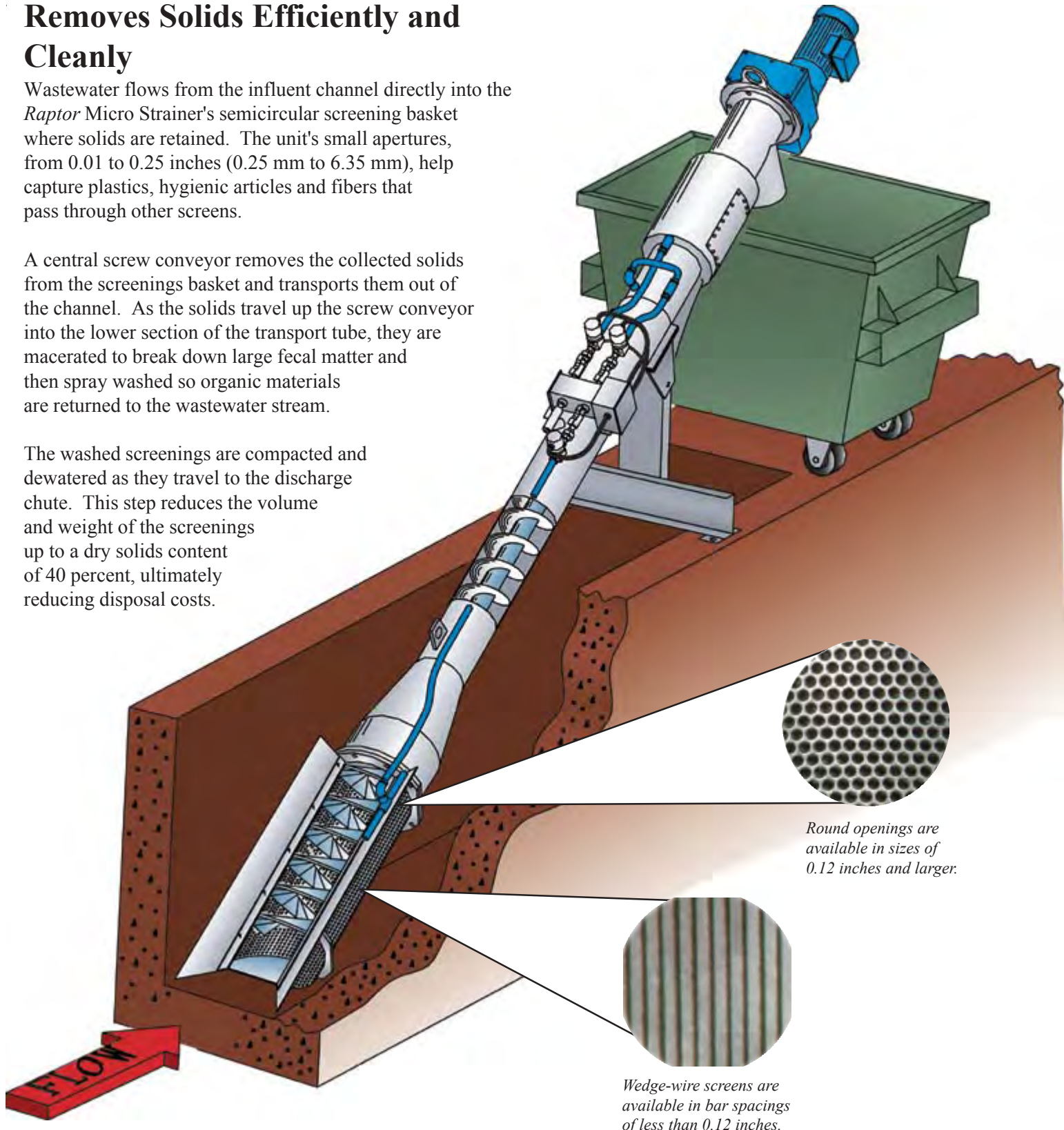
The Lakeside *Raptor* Micro Strainer meets and exceeds the expectations of operators worldwide by providing innovative screening solutions. Not only does the *Raptor* Micro Strainer remove solids from narrow channel installations but it also washes and dewateres the captured screenings. The *Raptor* Micro Strainer features simple design and operation and high removal efficiency with low disposal costs.

Removes Solids Efficiently and Cleanly

Wastewater flows from the influent channel directly into the *Raptor* Micro Strainer's semicircular screening basket where solids are retained. The unit's small apertures, from 0.01 to 0.25 inches (0.25 mm to 6.35 mm), help capture plastics, hygienic articles and fibers that pass through other screens.

A central screw conveyor removes the collected solids from the screenings basket and transports them out of the channel. As the solids travel up the screw conveyor into the lower section of the transport tube, they are macerated to break down large fecal matter and then spray washed so organic materials are returned to the wastewater stream.

The washed screenings are compacted and dewatered as they travel to the discharge chute. This step reduces the volume and weight of the screenings up to a dry solids content of 40 percent, ultimately reducing disposal costs.



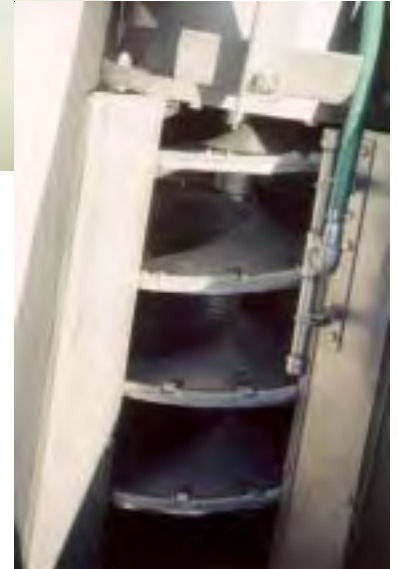
Design Features

Superior Design and Construction

- All stainless steel construction for superior corrosion resistance.
- The simple mechanical design requires very little maintenance which is ideal for small plants.
- A hinged structural support permits the unit to pivot out of the channel so all maintenance can be done above floor level.
- An uncomplicated drive assembly makes the unit easier to service and reduces maintenance costs.
- The unit is shipped fully assembled to minimize installation expenses.
- Lower polymer bearing blocks promote longer brush life and can be replaced without disassembling the screen.
- Thicker materials than competing units (0.25 in. thick outer tube and 0.12 in. thick basket) provide longer life.
- All mating parts are machined to ensure proper rotation.



The Raptor Micro Strainer's enclosed drive assembly reduces maintenance expenses.



The stainless steel, shaftless screw conveyor improves screening performance.



Exceptional Efficiency and Handling

- The unique screening basket and 35° to 45° angle of inclination provide high removal efficiency.
- A two-stage screenings wash water system aids in returning organic material to the wastewater stream.
- An integrated screening press reduces the volume and weight of screenings for lower disposal costs and cleaner operation.
- An enclosed transport tube and optional bagging attachment reduce odors and offer a clean working environment to the operator.
- An optional insulation and heating system permits operation in cold climates.

Additional *Raptor* Micro Strainer Features

Control Panel

Lakeside control panels are PLC equipped for versatile and efficient operation. Explosion-proof designs are available.



Operation is completely automatic.

Factory Pre-Wired

Factory pre-wired solenoid valves save installation costs.



Optional Bagging Attachment

The optional continuous bagging attachment provides a clean work area.



Optional Weather Protection System

Available for all sizes of screens and transport tubes, the Lakeside weather protection system protects to 13° below zero (minus 25° C).



Constructed of fiberglass reinforced polyester laminate.

Lakeside *Raptor* Screening Products

Fine Screen - Unique 3-plane screen design provides greater screenings removal efficiency without blinding.

Complete Plant - Screens inorganics and removes grit in one self-contained unit.

Rotating Drum Screen - With bar spacings as narrow as 0.01 inches, screens the finest solids.

Septage Acceptance Plant - Removes inorganic solids from municipal, industrial and septic tank sludge.

Wash Press - Lowers disposal costs by reducing the volume and weight of screenings.

Other Lakeside Screening Products

CSO Screens

Stormwater Screens

Water Intake Screens

Hydronic T telescoping rake bar screen cleaner



LAKESIDE
Water Purification Since 1928

1022 E. Devon, P.O. Box 8448
Bartlett, IL 60103
630/837-5640, FAX: 630/837-5647
E-mail: sales@lakeside-equipment.com

11/4/2015

LAKESIDE EQUIPMENT CORPORATION
PO Box 8448 Bartlett, IL 60103-8448

LAKESIDE MICRO STRAINER

Maximum Water Level= 19.88 in.

LEC: 1.4

JOB: Taos Ski Valley, New Mexico

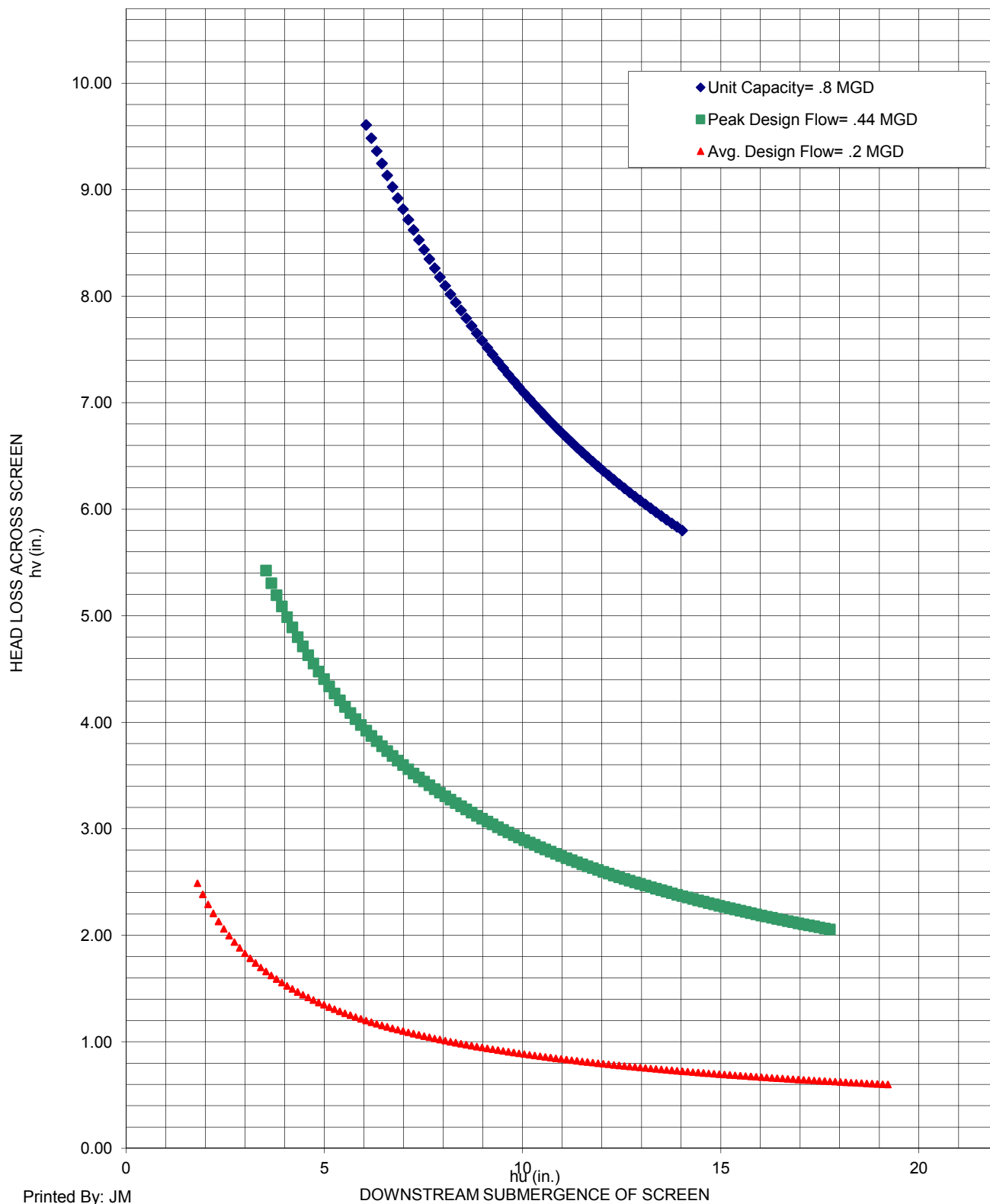
(Hu + Hv)

Diameter: 12"

ENG: TEC

Model: 12MS-0.125

: 1/8"



Printed By: JM



PRODUCT BENEFITS

- Dual lamp efficiency processes up to 300 gallons per minute
- 75% smaller footprint compared to standard UV systems
- May be mounted vertically or horizontally
- Up to four units may be controlled with a single micro-control box
- Built for 120V or 230V single phase power providing maximum flexibility
- No flow, no problem – guaranteed 60 minutes
- Water contact finish – Ra-15
- Controller- Remote
- Alarms, Remote Control, 4-20 mA output
- Real time dosimetry, 100% dosage assurance – with constant flow
- UV monitor is NIST traceable
- Sanitization in place – hot water or steam
- No-tool lamp change
- NSF Standard 50 certified
- Warranty one year parts and labor

SPECIFICATIONS

Flow Rate - gpm (m³/hr.) - 99% UVT @ 40mJ/cm²^A	300 (68)
Flow Rate - gpm (m³/hr.) - 99% UVT @ 30mJ/cm²^A	300 (68)
Flow Rate - gpm (m³/hr.) - 95% UVT @ 40mJ/cm²^A	226 (51.3)
Flow Rate - gpm (m³/hr.) - 95% UVT @ 30mJ/cm²^A	300 (68)
Number of High Output Amalgam Lamps	2
*Lamp Life - Hours	9000
Operating Power - watts	235
Operating Pressure - psi (bar)	150 (13)
Operating Temperature - °F (°C)	36 - 104 (2 - 40)
Pressure Drop at rated flow - psi (bar)	2.8 (0.24)
Dry Weight - pounds (kg)	54.8 (24.9)
Dimensions (L x H x D) - inches	30.6 x 7.9 x 11.4
Dimensions (L x H x D) - millimeters	776 x 201 x 290
*Sanitary Fittings - Standard	3 in.

^ At rated pressure drop.

* Lamp life is based on a maximum of one on-off cycle per day and room temperature water.

+ All units come standard with sanitary tri-clamp fittings for improved reliability, sanitation, and ease of installation. Alternative connections are available upon request.

NeoTech D428™

The NeoTech D428™ is specially designed to disinfect water and is an essential component in advanced oxidation processes.

This high-efficiency UV system utilizes NeoTech Aqua’s patented ReFlex™ chamber technology, reflecting over 99% of the 254nm UV generated. It is the highest efficiency, smallest footprint, and lowest operating cost UV system in the water treatment industry.

With only two twenty-eight inch lamps, the D428™ provides users the most convenient and lowest cost service schedule of any low pressure or medium pressure UV system today.

MAXIMUM UV PENETRATION

The NeoTech D428™ provides users an unparalleled level of engineering sophistication by maximizing UV distribution in a patented 99% reflective chamber. This unique technical advantage also reduces the number of lamps and power requirements by up to 90% compared to standard UV systems.

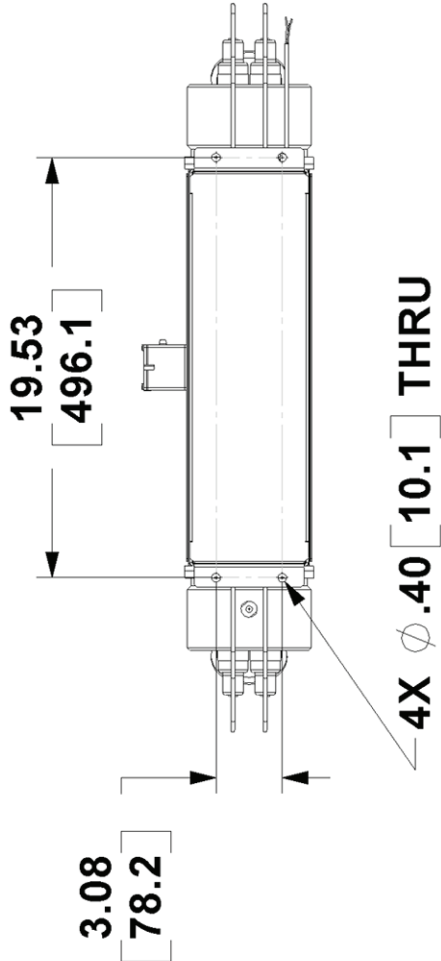
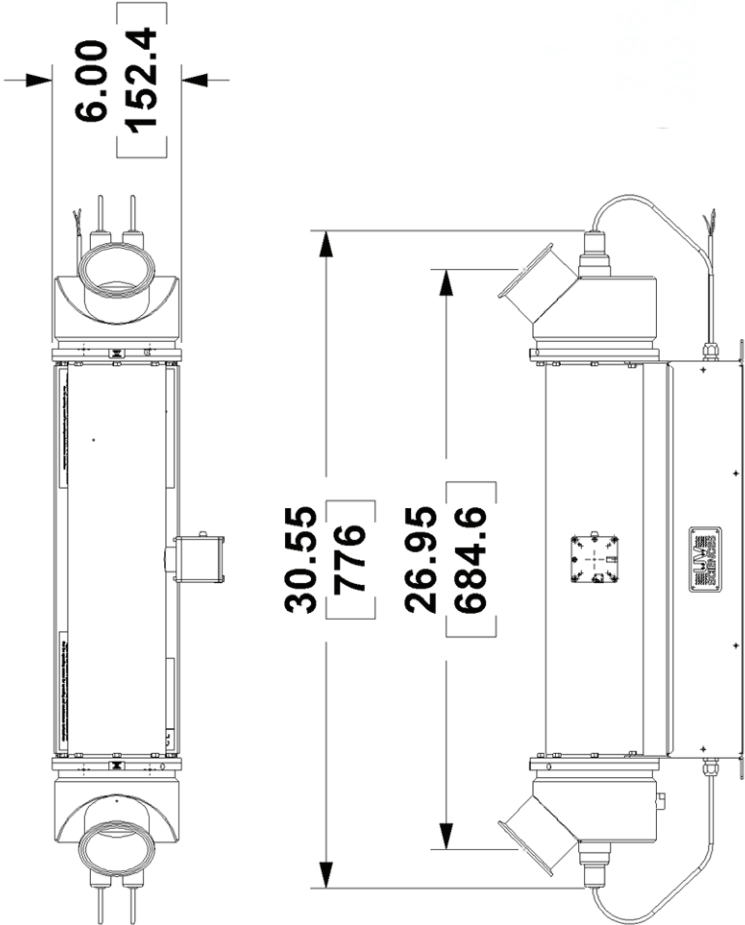
MINIMAL MAINTENANCE AND SERVICE

The service and maintenance requirements for the NeoTech D428™ are limited to three basic requirements:

- Lamp Replacement: No Tools Required
- UV Monitor: May be changed with a single screwdriver while the system is operating
- Cleaning: May be cleaned as needed in a CIP loop or manually brushed.

UNPARALLELED EFFICIENCY

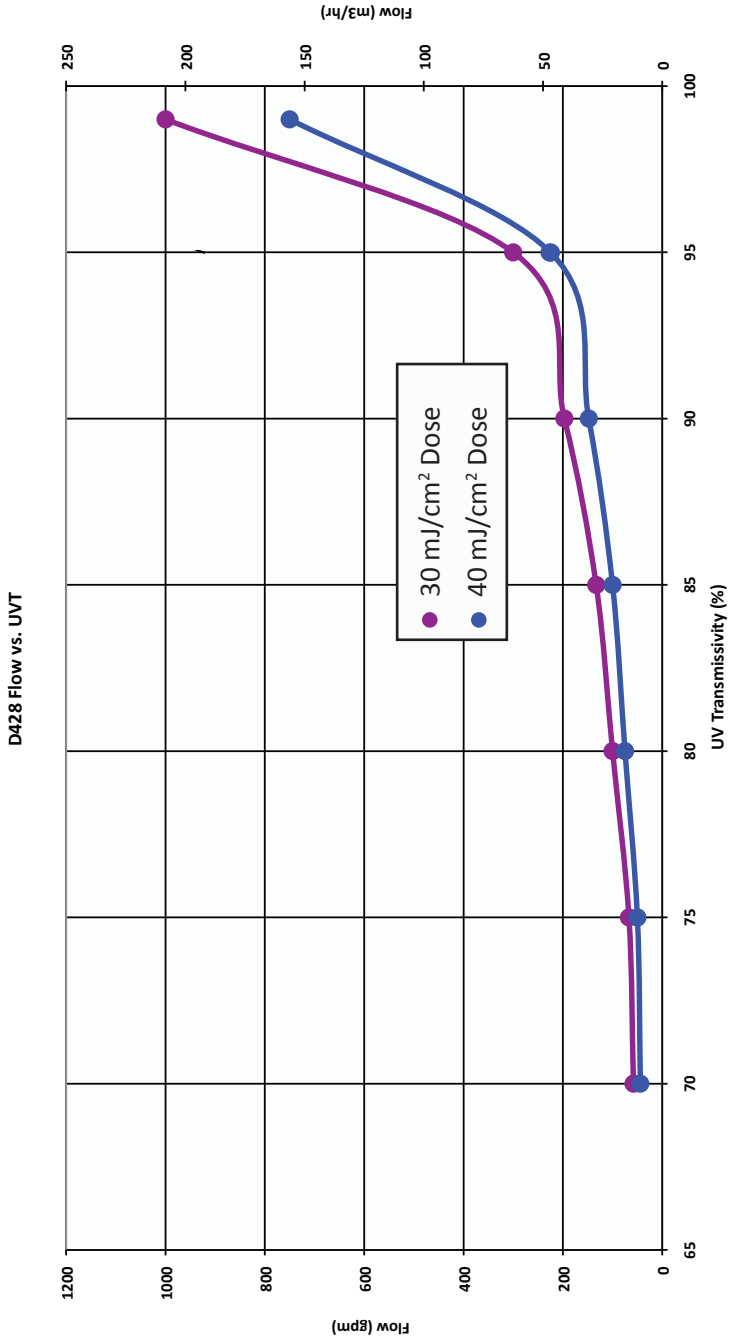
The NeoTech D428™ boasts the smallest footprint in its class. With as few as one-tenth as many bulbs compared to standard UV systems, it has the lowest operating cost and maintenance schedule in the field.



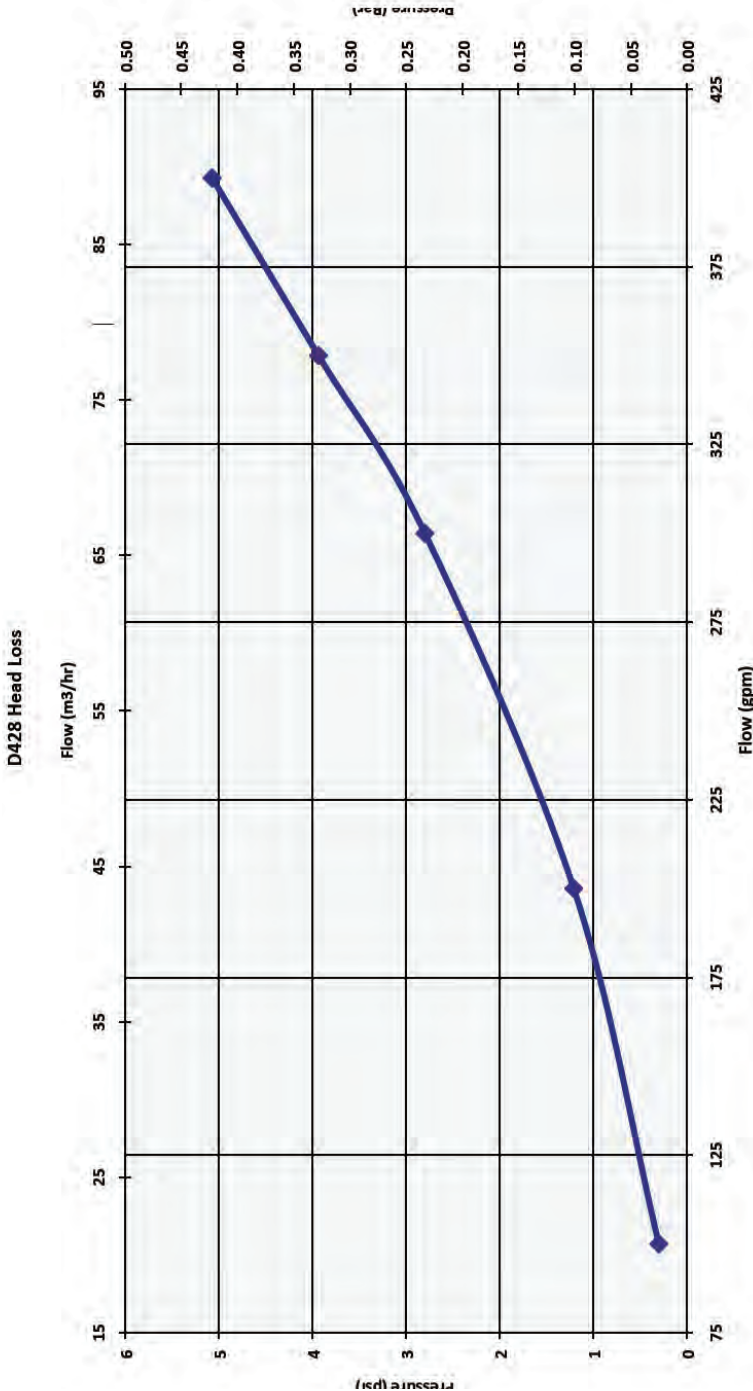
OPTIONS AND SPARES

Description	Part Number
*Light Trap Kit	UVLTk-4
Cleaning Kit	CK-4-1
Amalgam Lamp Kit	LK-28
Lamp Sleeve Kit	OSK-28
UV Monitor Calibration	UVIM-CAL
Ballast Kit, 120V	BK-120
Ballast Kit, 230V	BK-230

* Reflected UV light may be harmful to nonmetallic surfaces, such as PPL, PVC, and other plastics. Therefore, it is recommended that a light trap be installed on your unit.



The UV transmissivity (UVT) of the treated water, combined with the flow rate through the unit, determine the UV dosage applied to the water. Particles in water typically absorb or reflect UV light which affects the water's UV transmissivity. Neotech Aqua's units are rated based on a UVT of 95%. The above graph illustrates the appropriate rating for the D428 based on varying UVT levels. The Neotech Aqua Solutions technical team provides complimentary UVT analysis on customer-supplied water samples to ensure proper UV equipment sizing. Please contact your Neotech Aqua representative for assistance.





PRODUCT BENEFITS

- Dual lamp efficiency processes up to 500 gallons per minute
- 75% smaller footprint compared to standard UV systems
- May be mounted vertically or horizontally
- Up to four units may be controlled with a single micro-control box
- Built for 120V or 230V single phase power providing maximum flexibility
- No flow, no problem – guaranteed 60 minutes
- Water contact finish – Ra-15
- Controller- Remote
- Alarms, Remote Control, 4-20 mA output
- Real time dosimetry, 100% dosage assurance – with constant flow
- UV monitor is NIST traceable
- Sanitization in place – hot water or steam
- No-tool lamp change
- NSF Standard 50 certified
- Warranty one year parts and labor

SPECIFICATIONS

Flow Rate - gpm (m³/hr.) - 99% UVT @ 40mJ/cm²^A	500 (90.8)
Flow Rate - gpm (m³/hr.) - 99% UVT @ 30mJ/cm²^A	500 (90.8)
Flow Rate - gpm (m³/hr.) - 95% UVT @ 40mJ/cm²^A	329 (74.7)
Flow Rate - gpm (m³/hr.) - 95% UVT @ 30mJ/cm²^A	500 (90.8)
Number of High Output Amalgam Lamps	2
Lamp Life - Hours*	9000
Operating Power - watts	303
Operating Pressure - psi (bar)	150 (13)
Operating Temperature - °F (°C)	36 - 104 (2 - 40)
Pressure Drop at rated flow - psi (bar)	10.9 (0.95)
Dry Weight - pounds (kg)	63 (28.6)
Dimensions (L x H x D) - inches	40.6 x 7.9 x 11.4
Dimensions (L x H x D) - millimeters	1030 x 201 x 290
Sanitary Fittings - Standard*	3 in.

^ At rated pressure drop.

* Lamp life is based on a maximum of one on-off cycle per day and room temperature water.

+ All units come standard with sanitary tri-clamp fittings for improved reliability, sanitation, and ease of installation. Alternative connections are available upon request.

The NeoTech D438™ is specially designed to disinfect water and is an essential component in advanced oxidation processes.

This high-efficiency UV system utilizes NeoTech Aqua's patented ReFlex™ chamber technology, reflecting over 99% of the 254nm UV generated. It is the highest efficiency, smallest footprint, and lowest operating cost UV system in the water treatment industry.

With only two thirty-eight inch lamps, the D438™ provides users the most convenient and lowest cost service schedule of any low pressure or medium pressure UV system today.

MAXIMUM UV PENETRATION

The NeoTech D438™ provides users an unparalleled level of engineering sophistication by maximizing UV distribution in a patented 99% reflective chamber. This unique technical advantage also reduces the number of lamps and power requirements by up to 90% compared to standard UV systems.

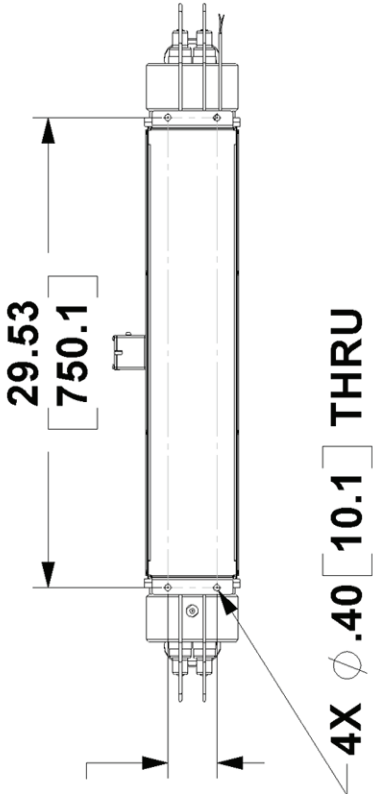
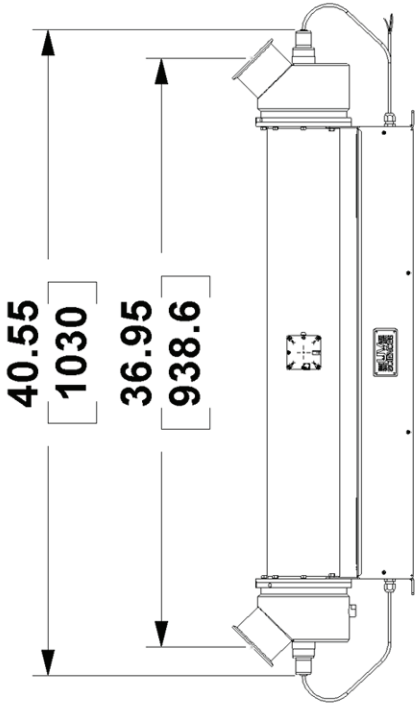
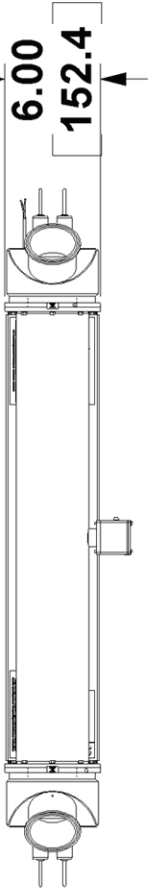
MINIMAL MAINTENANCE AND SERVICE

The service and maintenance requirements for the NeoTech D438™ are limited to three basic requirements:

- Lamp Replacement: No Tools Required
- UV Monitor: May be changed with a single screwdriver while the system is operating
- Cleaning: May be cleaned as needed in a CIP loop or manually brushed.

UNPARALLELED EFFICIENCY

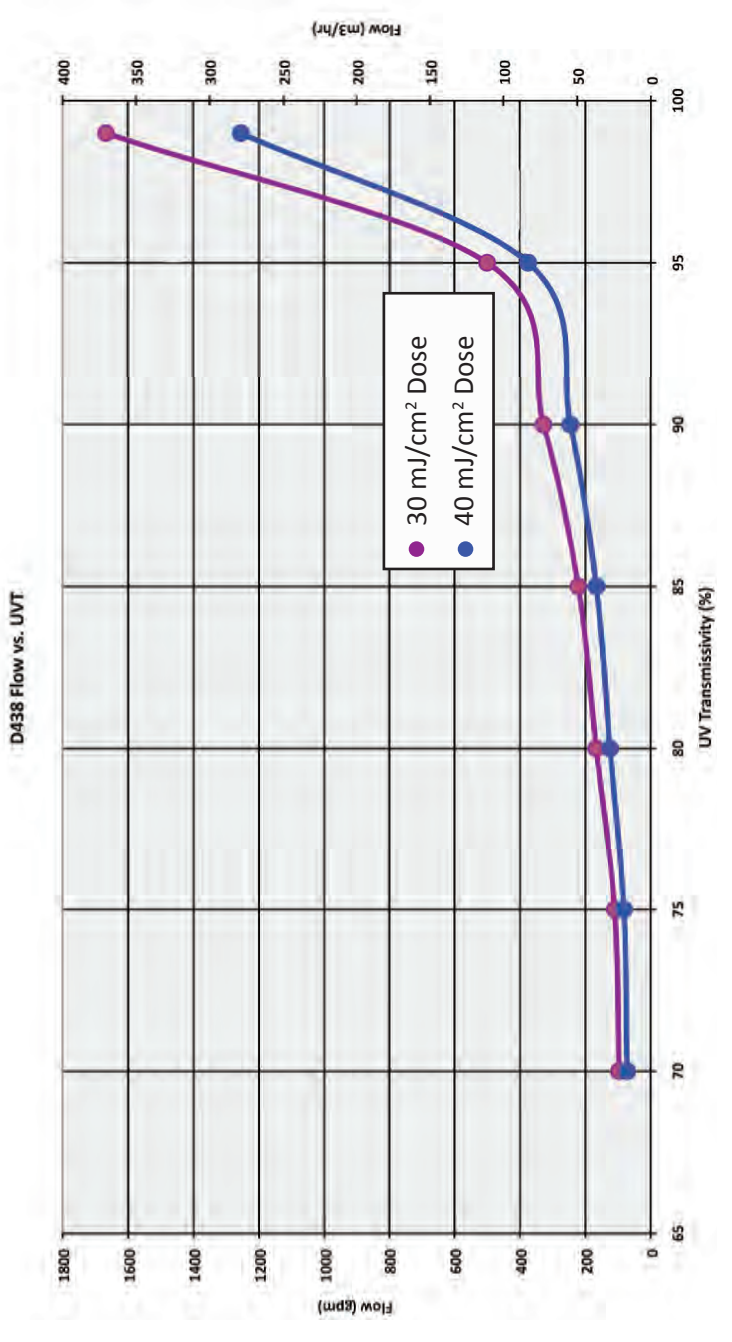
The NeoTech D438™ boasts the smallest footprint in its class. With as few as one-tenth as many bulbs compared to standard UV systems, it has the lowest operating cost and maintenance schedule in the field.



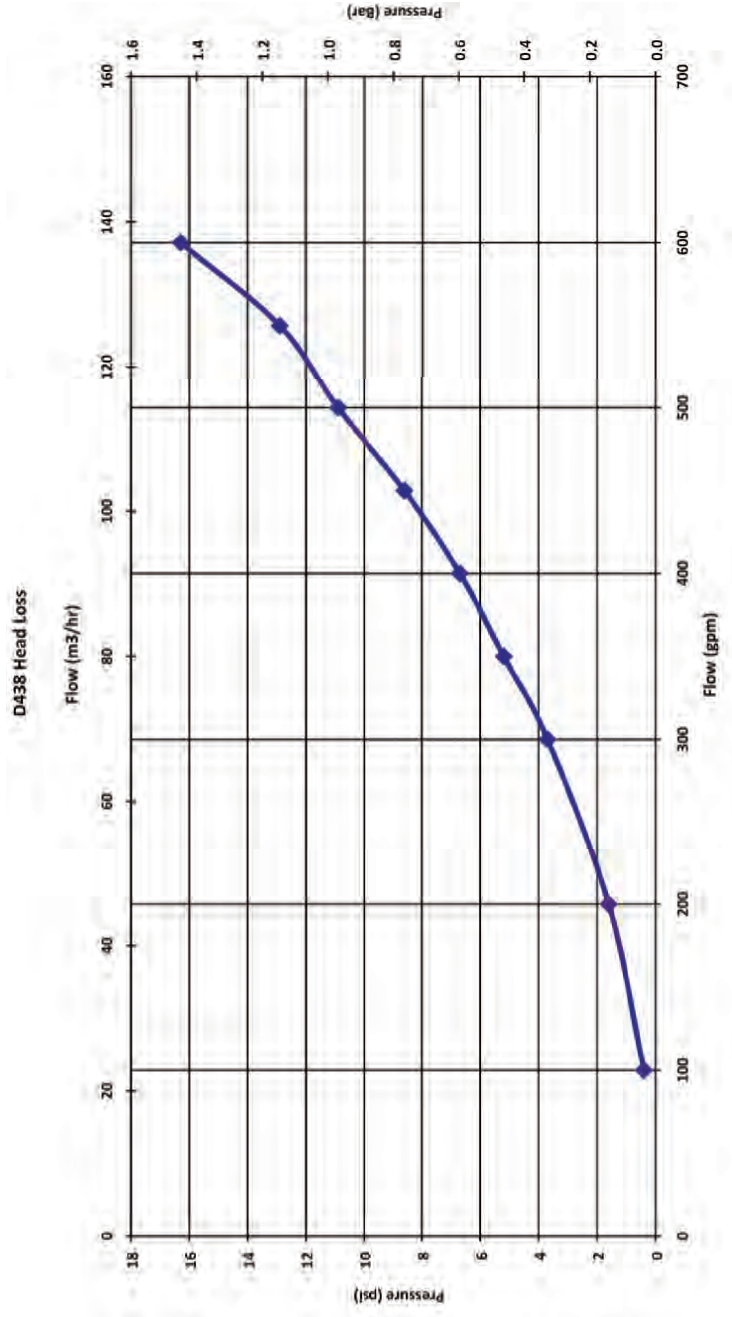
OPTIONS AND SPARES

Description	Part Number
Light Trap Kit*	UVLTk-4
Cleaning Kit	CK-4-1
Amalgam Lamp Kit	LK-38
Lamp Sleeve Kit	OSK-38
UV Monitor Calibration	UVIM-CAL
Ballast Kit, 120V	BK-120
Ballast Kit, 230V	BK-230

* Reflected UV light may be harmful to nonmetallic surfaces, such as PPL, PVC, and other plastics. Therefore, it is recommended that a light trap be installed on your unit.



The UV transmissivity (UVT) of the treated water, combined with the flow rate through the unit, determine the UV dosage applied to the water. Particles in water typically absorb or reflect UV light which affects the water's UV transmissivity. NeoTech Aqua's units are rated based on a UVT of 95%. The above graph illustrates the appropriate rating for the D438 based on varying UVT levels. The NeoTech Aqua Solutions technical team provides complimentary UVT analysis on customer-supplied water samples to ensure proper UV equipment sizing. Please contact your NeoTech Aqua representative for assistance.



APPENDIX C.6

TERTIARY FILTRATION

PHOSPHORUS REMOVAL

Advanced Phosphorus Removal

Blue Water Technologies, Inc. is the industry leader in the development of technologies for phosphorus removal from wastewater. With advanced control techniques and patented nutrient removal systems, Blue Water can provide you with a cost effective solution to meet your phosphorus level needs.

The Blue PRO® system provides a unique approach to chemical dosing, with significantly lower chemical use across the entire wastewater treatment plant than competitors. No other chemical dosing is required in the plant to achieve the lowest phosphorus discharge requirements. Current Blue PRO® installations are meeting permit limits as low as 0.05 mg/L with a chemical dose of only 10 mg/L as Fe. Blue Water's unique chemical control system provides an advantage due to its cost efficiency and ability to seamlessly integrate into and respond to the needs of existing wastewater treatment systems. The chemical dose used with Blue PRO® methods is so much lower than the competition that the comparative savings represent a return on the capital investment in less than three years.

The Blue PRO® process is the leading technology for phosphorus reduction to any level. Whether the targeted phosphorus discharge limit is 10 mg/L P or as low as 0.01 mg/L P, Blue PRO® methods provide reductions in chemical usage, equipment footprint, and associated operations and maintenance costs over alternative technologies. The Blue PRO® platform is the most effective and most inexpensive tertiary treatment solution where additional considerations are needed, such as denitrification or metals removal.



A Blue PRO® installation in Grangeville, Idaho for 0.05 mg/L phosphorus

Blue PRO®

The Blue PRO® System

How does the Blue PRO® process work? Using Blue Water's Centra-flo® continuous backwash gravity sand filters, a unique control system, and the patented Blue PRO® process for reactive filtration, phosphorus is removed from wastewater streams through an array of mechanisms. Most importantly, Blue PRO® systems optimize adsorption.

Blue Water's reactive filtration process overcomes a critical obstacle to achieving efficient phosphorus removal in bulk aqueous solutions by providing reactive surface sites within the media bed, resulting in forced contact of chemical species with high adsorptive capacity. The adsorptive surface in Blue PRO® filters is a continuously regenerated hydrous ferric oxide (HFO) coating that forms on the surface of the sand media. Coagulation followed by filtration simply cannot compare to the efficiency of adsorptive phosphorus removal.

Waste HFO, phosphorus, and solids are removed from the filter through the backwash or reject stream. Recycling this reject upstream provides the added benefit of removing phosphorus in plant clarification systems, further guaranteeing the achievement of the discharge phosphorus target as well as lowering the chemical dose. The phosphorus is chemically bound, leaving the plant with the sludge, rather than releasing in effluent streams or digestion. Integration of Blue Water's phosphorus removal technology does not require change in the plant's sludge handling system. The Blue PRO® system uses over 30% less chemical than other technologies, therefore producing less sludge. The waste HFO also helps with odor control and can reduce water content in biosolids.

Blue PRO® Applications:

- Advanced total phosphorus removal
- Metals removal, including mercury
- Combined denitrification
- Algae mitigation

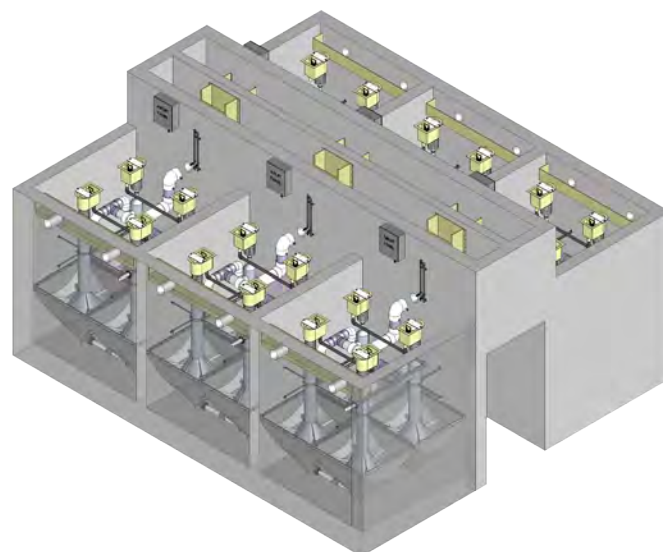


The Blue PRO® system is available in several models and configurations. The modular nature of the filters allows for easy system expansion. The filters are available as freestanding fiberglass or stainless steel units or as in-ground concrete cells. Control systems and smaller filters may be skid mounted for mobility or ease of commissioning.

Additional Features

Since many plants requiring phosphorus mitigation also require nitrogen control, Blue Water provides the option to simultaneously denitrify in the same vessel with the Blue PRO® process. With slight modifications, Blue Water can provide a unique and efficient system for total nutrient reduction.

Besides phosphorus, Blue PRO® methods are effective at removing many other contaminants, such as mercury, arsenic, chromium, and uranium. Minor adjustments in water chemistry may be implemented for the removal of metals and other contaminants, including zinc, lead, copper, iron, and manganese. Blue Water has installations for removal of these contaminants in wastewater plants as well as groundwater systems, including self-contained package treatment systems.



4.3 MGD Blue PRO® system design for 0.07 mg/L TP in a Massachusetts WWTP

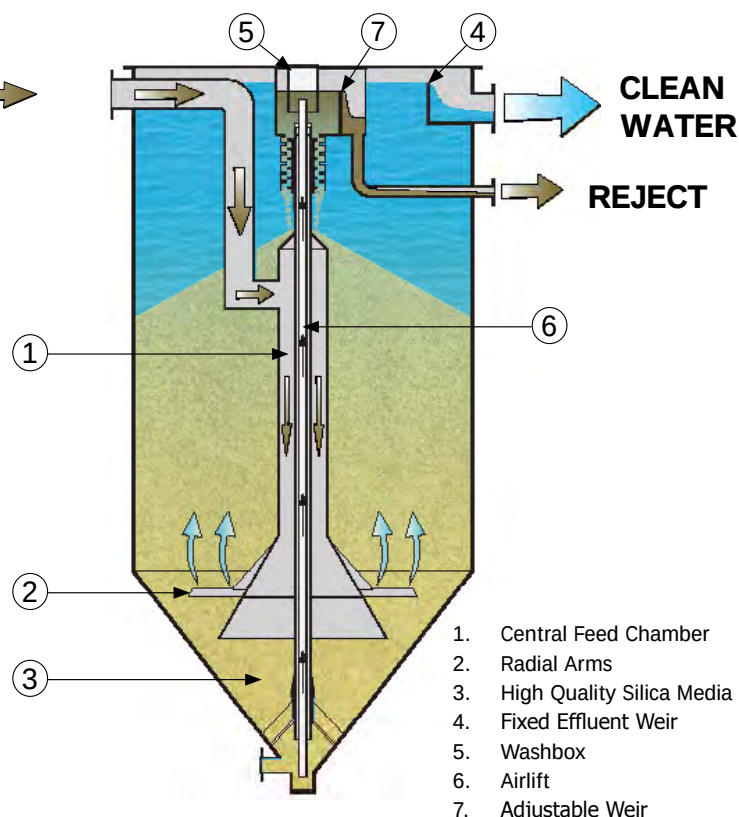
INFLUENT → + CHEMICAL →

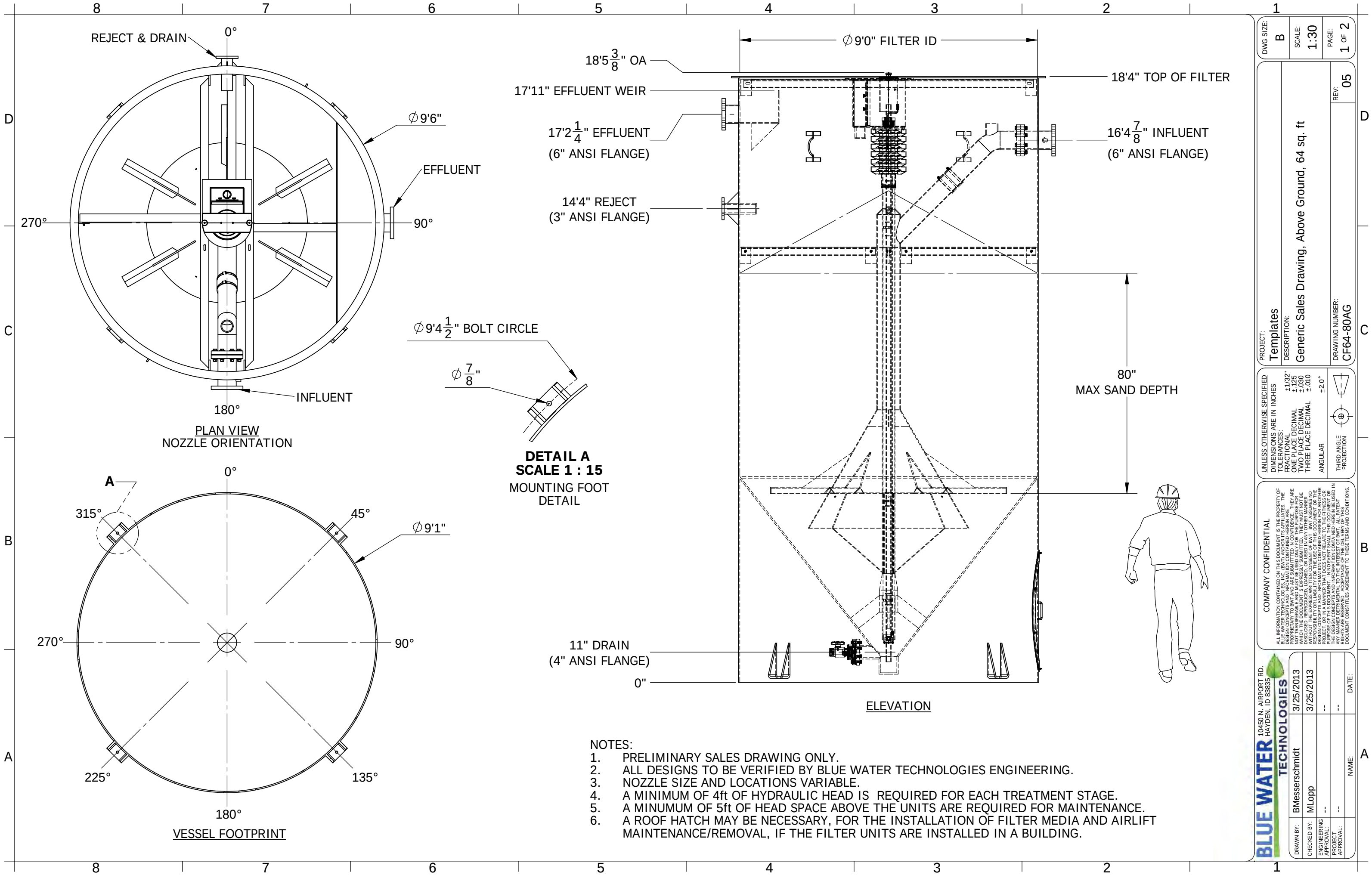
Blue PRO®

Blue Water's Blue PRO® technology is covered by multiple patents and patents pending.

The Blue PRO® Advantages:

- Low capital and O&M costs
- Continuous flow – no interruption for backwash or changing media
- Modular design easily handles capacity increases
- Simple operation & low chemical use





DWG SIZE:
B

SCALE:
1:30

PAGE:
1 OF 2

PROJECT:
Templates

DESCRIPTION:
Generic Sales Drawing, Above Ground, 64 sq. ft

DRAWING NUMBER:
CF64-80AG

REV:
05

UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN INCHES. TOLERANCES:
FOR ALL DIMENSIONS
ONE PLACE DECIMAL
TWO PLACE DECIMAL
THREE PLACE DECIMAL
ANGULAR
THIRD ANGLE PROJECTION

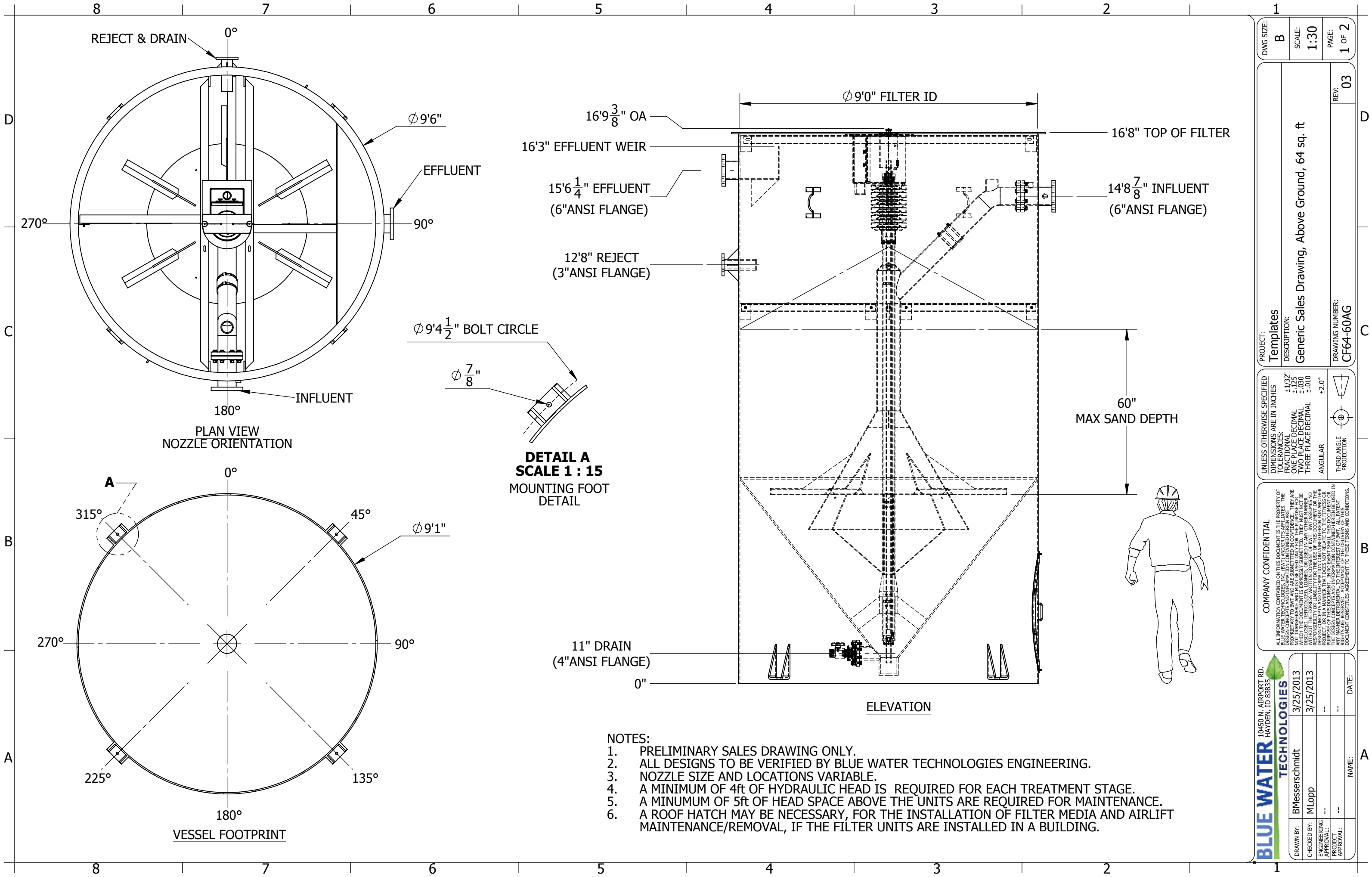
±1/32"
±1/32"
±.030
±.010
±2.0°

10450 N. AIRPORT RD.
HAYDEN, ID 83835

BLUE WATER TECHNOLOGIES

DRAWN BY:	BMesserschmidt	3/25/2013
CHECKED BY:	MLopp	3/25/2013
ENGINEERING APPROVAL:	--	--
PROJECT APPROVAL:	--	--

NAME: DATE:



DWG SIZE: BSCALE: 1:30PAGE: 1 OF 2

PROJECT: TemplatesDESCRIPTION: Generic Sales Drawing, Above Ground, 64 sq. ftDRAWING NUMBER: CF64-60AGREV: 03

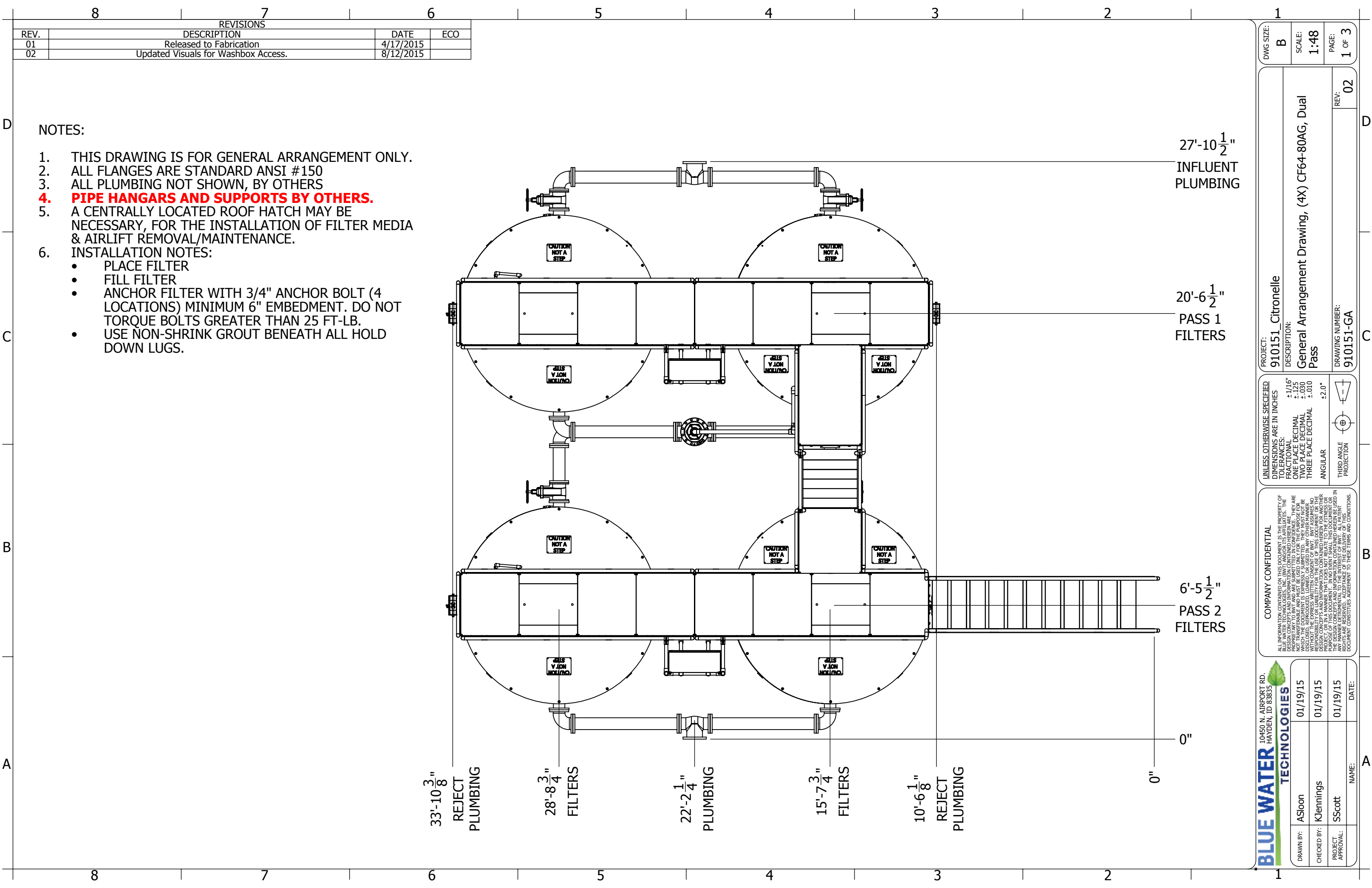
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES: FINISH: ±.125 ONE PLACE DECIMAL ±.030 TWO PLACE DECIMAL ±.010 THREE PLACE DECIMAL ANGULAR ±2.0° THIRD ANGLE PROJECTION

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BLUE WATER TECHNOLOGIES

DRAWN BY: BMesserschmidt3/25/2013CHECKED BY: MLopp3/25/2013ENGINEERING APPROVAL: --PROJECT APPROVAL: --NAME: --DATE: --



NOTES:

1. THIS DRAWING IS FOR GENERAL ARRANGEMENT ONLY.
2. ALL FLANGES ARE STANDARD ANSI #150
3. ALL PLUMBING NOT SHOWN, BY OTHERS
4. **PIPE HANGARS AND SUPPORTS BY OTHERS.**
5. A CENTRALLY LOCATED ROOF HATCH MAY BE NECESSARY, FOR THE INSTALLATION OF FILTER MEDIA & AIRLIFT REMOVAL/MAINTENANCE.
6. INSTALLATION NOTES:
 - PLACE FILTER
 - FILL FILTER
 - ANCHOR FILTER WITH 3/4" ANCHOR BOLT (4 LOCATIONS) MINIMUM 6" EMBEDMENT. DO NOT TORQUE BOLTS GREATER THAN 25 FT-LB.
 - USE NON-SHRINK GROUT BENEATH ALL HOLD DOWN LUGS.

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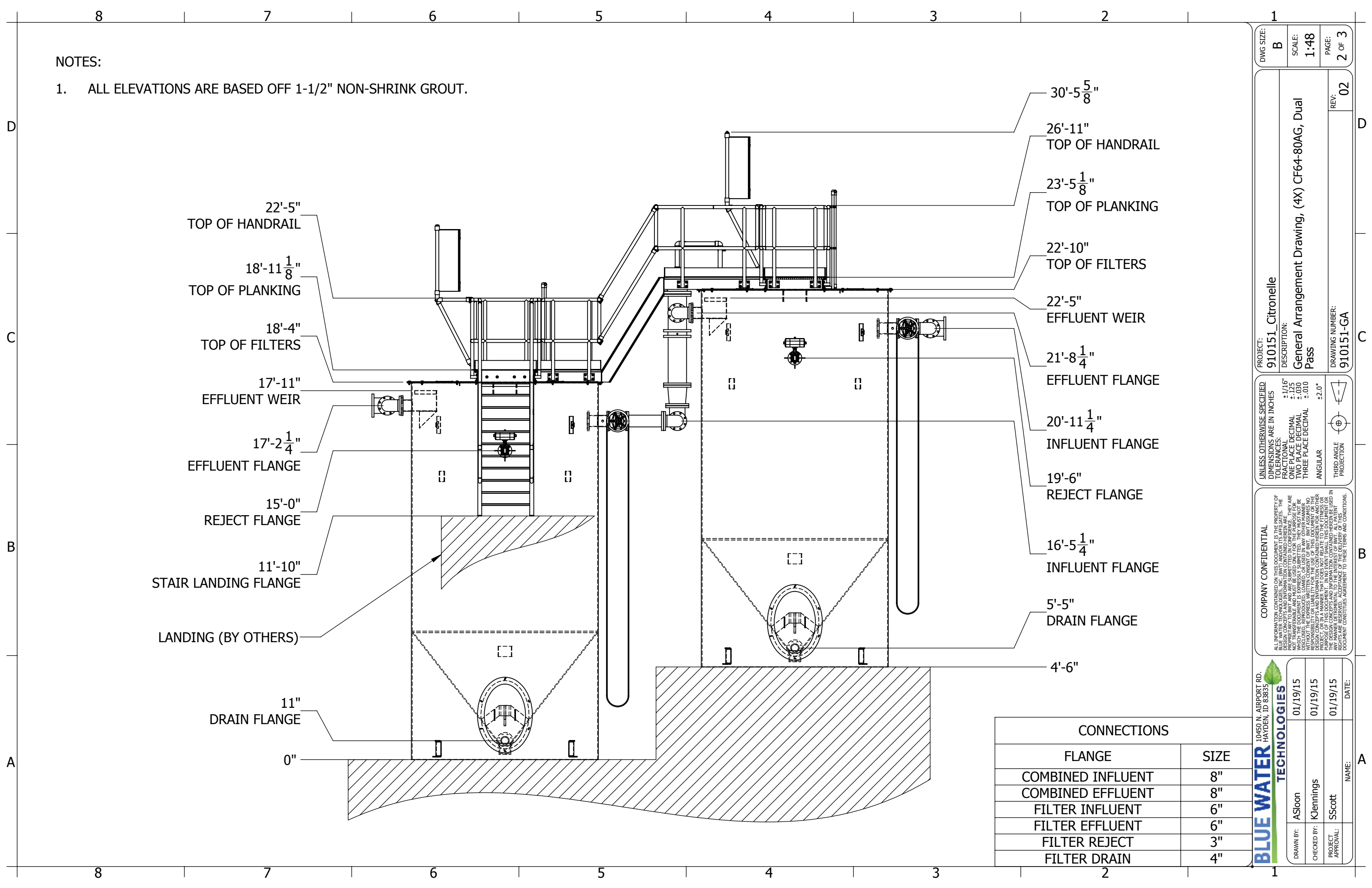
BLUE WATER
TECHNOLOGIES

DRAWN BY:	ASloen	01/19/15
CHECKED BY:	Klenings	01/19/15
PROJECT APPROVAL:	SScott	01/19/15
NAME:	DATE:	

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PROJECT: 910151_Citronelle	
DESCRIPTION: General Arrangement Drawing, (4X) CF64-80AG, Dual Pass	
DWG SIZE: B	SCALE: 1:48
PAGE: 1 OF 3	
REV: 02	
DRAWING NUMBER: 910151-GA	

UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN INCHES. TOLERANCES: FINISH: ±1/16" ONE PLACE DECIMAL ±.010 TWO PLACE DECIMAL ±.010 THREE PLACE DECIMAL ±.010 ANGULAR ±2.0° THIRD ANGLE PROJECTION



NOTES:
1. ALL ELEVATIONS ARE BASED OFF 1-1/2" NON-SHRINK GROUT.

DWG SIZE: BSCALE: 1:48PAGE: 2 OF 3

PROJECT: 910151_CitronelleDESCRIPTION: General Arrangement Drawing, (4X) CF64-80AG, Dual PassREV: 02DRAWING NUMBER: 910151-GA

UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN INCHES. TOLERANCES: FINISH: ±1/16" ONE PLACE DECIMAL ±.030 TWO PLACE DECIMAL ±.010 THREE PLACE DECIMAL ±.005 ANGULAR ±2.0° THIRD ANGLE PROJECTION

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BLUE WATER TECHNOLOGIES

DRAWN BY:	ASloan	01/19/15
CHECKED BY:	Klenings	01/19/15
PROJECT APPROVAL:	SScott	01/19/15

NAME:	DATE:
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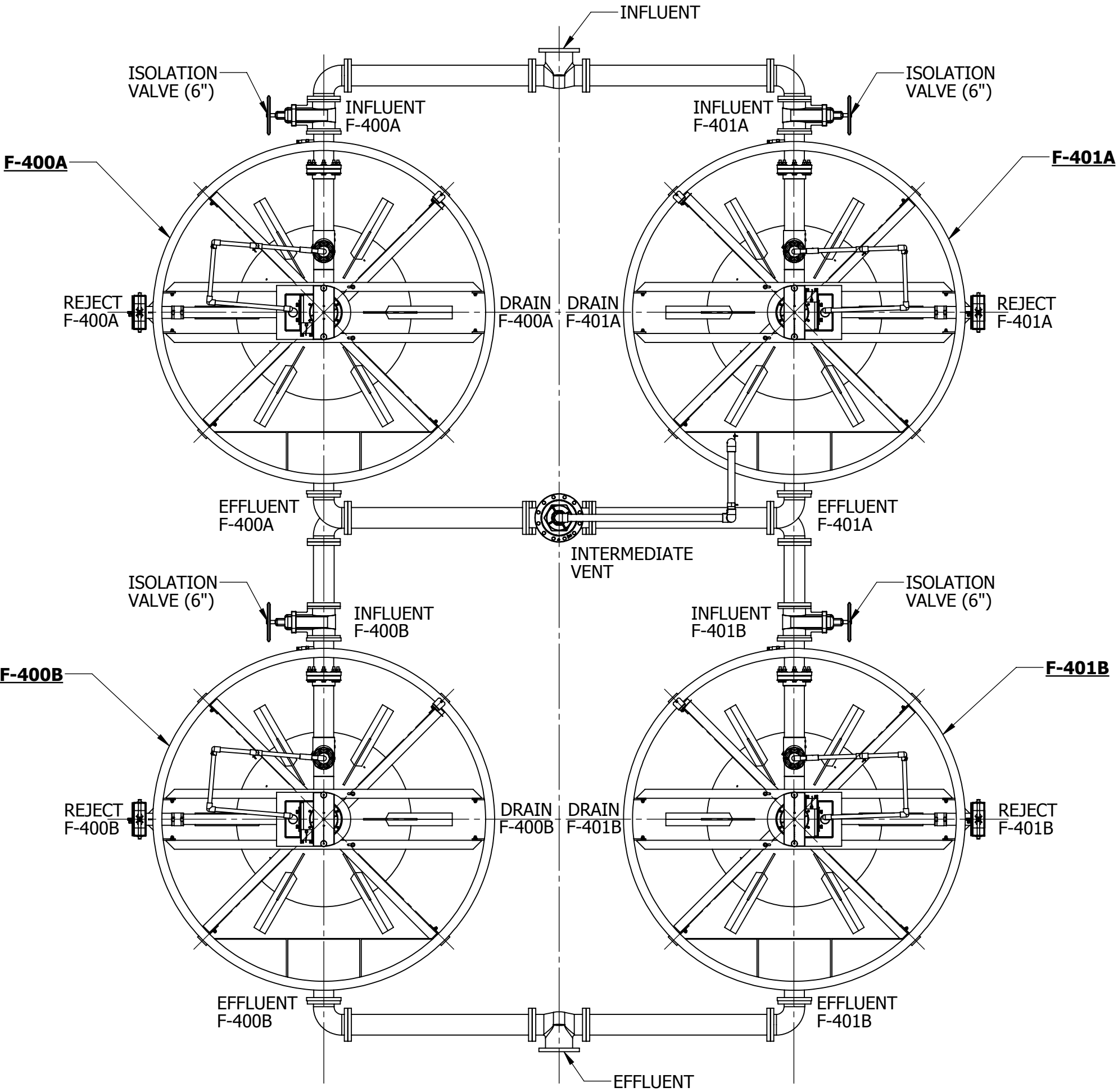
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FLANGE	SIZE
COMBINED INFLUENT	8"
COMBINED EFFLUENT	8"
FILTER INFLUENT	6"
FILTER EFFLUENT	6"
FILTER REJECT	3"
FILTER DRAIN	4"

D

C

B

A



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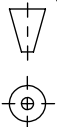


DRAWN BY:	ASloon	01/19/15
CHECKED BY:	Klenings	01/19/15
PROJECT APPROVAL:	SScott	01/19/15
NAME:		DATE:

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DIMENSIONS ARE IN INCHES
TOLERANCES:
FRACTIONS: +1/16"
ONE PLACE DECIMAL +.015
TWO PLACE DECIMAL +.030
THREE PLACE DECIMAL +.010
ANGULAR ±2.0°
THIRD ANGLE PROJECTION



PROJECT: 910151_Citronelle

DESCRIPTION: General Arrangement Drawing, (4X) CF64-80AG, Dual Pass

DRAWING NUMBER: 910151-GA

REV: 02

DWG SIZE: B

SCALE: 1:36

PAGE: 3 OF 3

D

C

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A

TEMPLATE LAST MODIFIED: 2022.03.23



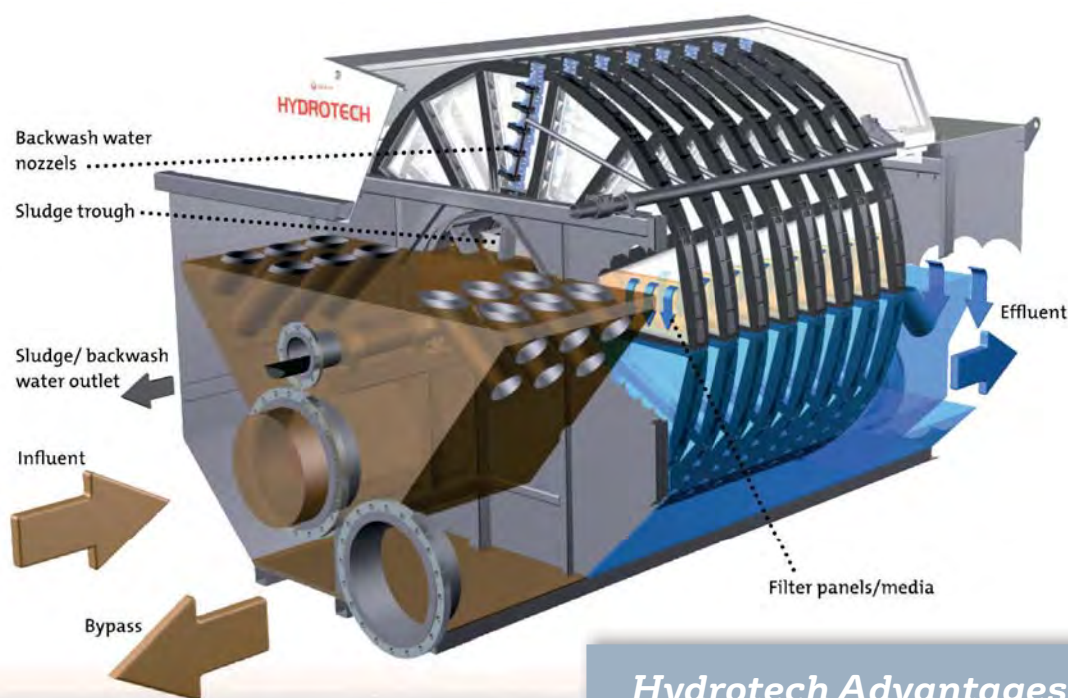
Hydrotech Discfilter Pure Performance

WATER TECHNOLOGIES

The Discfilter Process

The Hydrotech Discfilter provides proven experience for today's demanding wastewater treatment applications through an efficient, yet easy-to-operate design. Influent flows by gravity into the center drum and then passes through the filter media mounted on both sides of the discs. The solids are retained on the media within the discs. Only purified water flows to the collection tank. The inside-out flow path prevents solids accumulation in the tank.

As solids collect on the inside of the media the influent water level rises. Maximum head loss through the media is <12 inches. The inlet water level is measured and the control system automatically initiates backwashing. The filtered effluent is pumped to the backwash spray nozzles, washing solids into the sludge trough as the discs rotate. The backwash water is typically 1% to 2% of the total flow to the filter, while the sludge return is typically <1%. Filtration is continuously maintained, even during backwash.



Hydrotech Advantages

- Unmatched experience and performance
- Innovation: patented designs offer real savings
- Robust construction with 304 or 316 SSTL
- Proven media: durable and chemically resistant
- Meets or exceeds Title 22 requirements at hydraulic loading rates up to and above 6 gpm/ft²
- Consistently produces high quality effluent despite high-solids loadings and upset conditions
- Ideal for "retro-fit" projects in existing basins
- Compact design requires far less space
- Simplified control system and lower installation costs than other filtration technologies
- Improved backwash efficiency reduces operating costs and carbon footprint



Progressive Innovation

The Hydrotech Discfilter utilizes many patented designs including the oscillating backwash spray header, which provides efficient media cleaning while reducing water consumption by 20 percent. Ongoing research ensures the most cost effective filtration methods available.

The Hydrotech Discfilter is available in a variety of models:

1700 series

- Up to 8 discs
- Up to 1 MGD per unit in effluent polishing
- Ideal for small scale projects



2200 series

- Up to 24 discs
- Up to 9 MGD per unit in effluent polishing
- Excellent for a wide range of project sizes

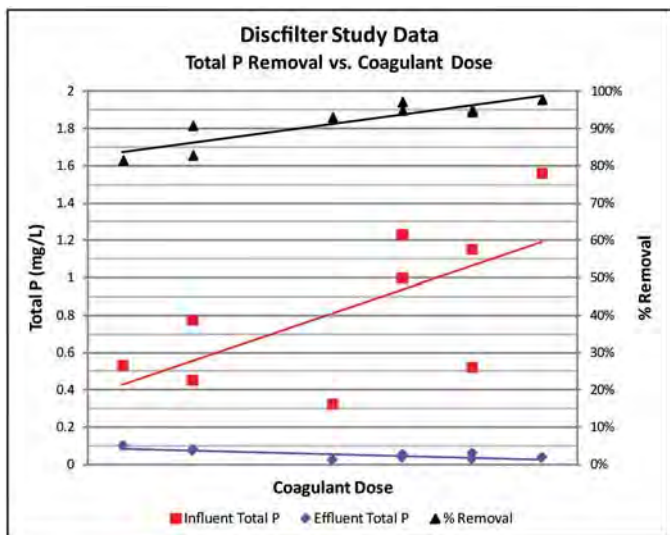


2600 series

- Up to 30 discs for 15 MGD per unit in effluent polishing
- Provides highest filtration area and most compact footprint
- High flow rates maximize treatment in a given footprint
- Energy reduced 15% and footprint by 25%
- User-friendly design for minimal maintenance



Advanced Treatment



The Hydrotech Discfilter enables facilities to meet stringent performance requirements.

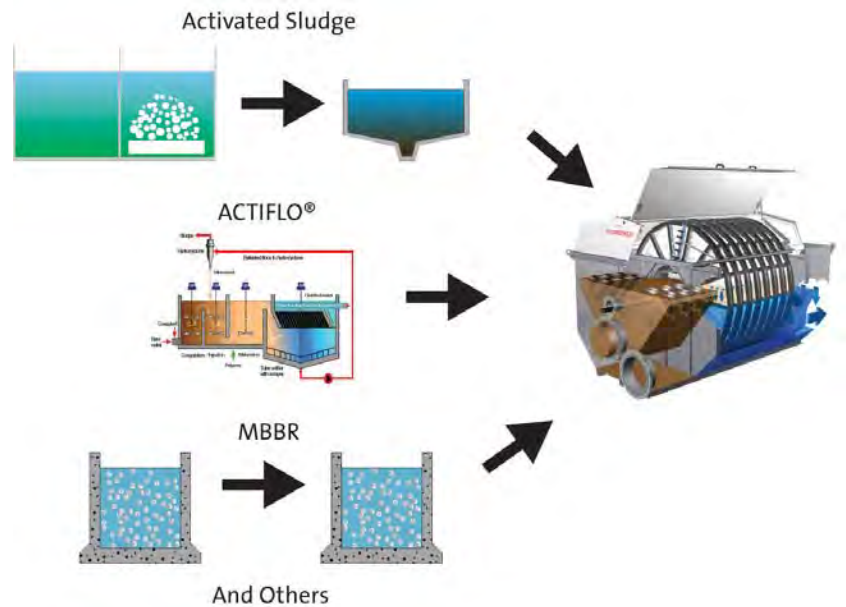
Veolia has pioneered use of the discfilter in combination with coagulation/ flocculation as a cost effective means to reduce effluent phosphorus to < 0.1 mg/L.

Proven Performance

The compact Hydrotech Discfilter is used in a wide range of applications:

- Effluent polishing of wastewater
- Phosphorus removal
- Water reuse (Title 22 approved)
- Retrofit/replacement of existing systems
- CSO, SSO, and primary treatment
- Process water filtration
- Membrane pre-treatment

The Hydrotech Discfilter is ideal for treating effluent from a variety of processes (e.g., activated sludge, fixed film, etc.). Veolia offers full-scale pilots to demonstrate performance.



Designed To Save

Hydrotech systems enable customers to achieve performance with lower cost and straight-forward maintenance. Hydrotech Discfilters provide a large filter area in a small footprint; up to 75% smaller than sand filters and up to 20% smaller than other cloth filters.

The discfilter is delivered as an assembled unit. Other cloth filters require substantial labor for site assembly and a larger footprint for backwash pumps and valves. The discfilter eliminates these concerns and costs. Installation is as simple as off-loading from a trailer, anchoring the unit, and completing mechanical and electrical connections.

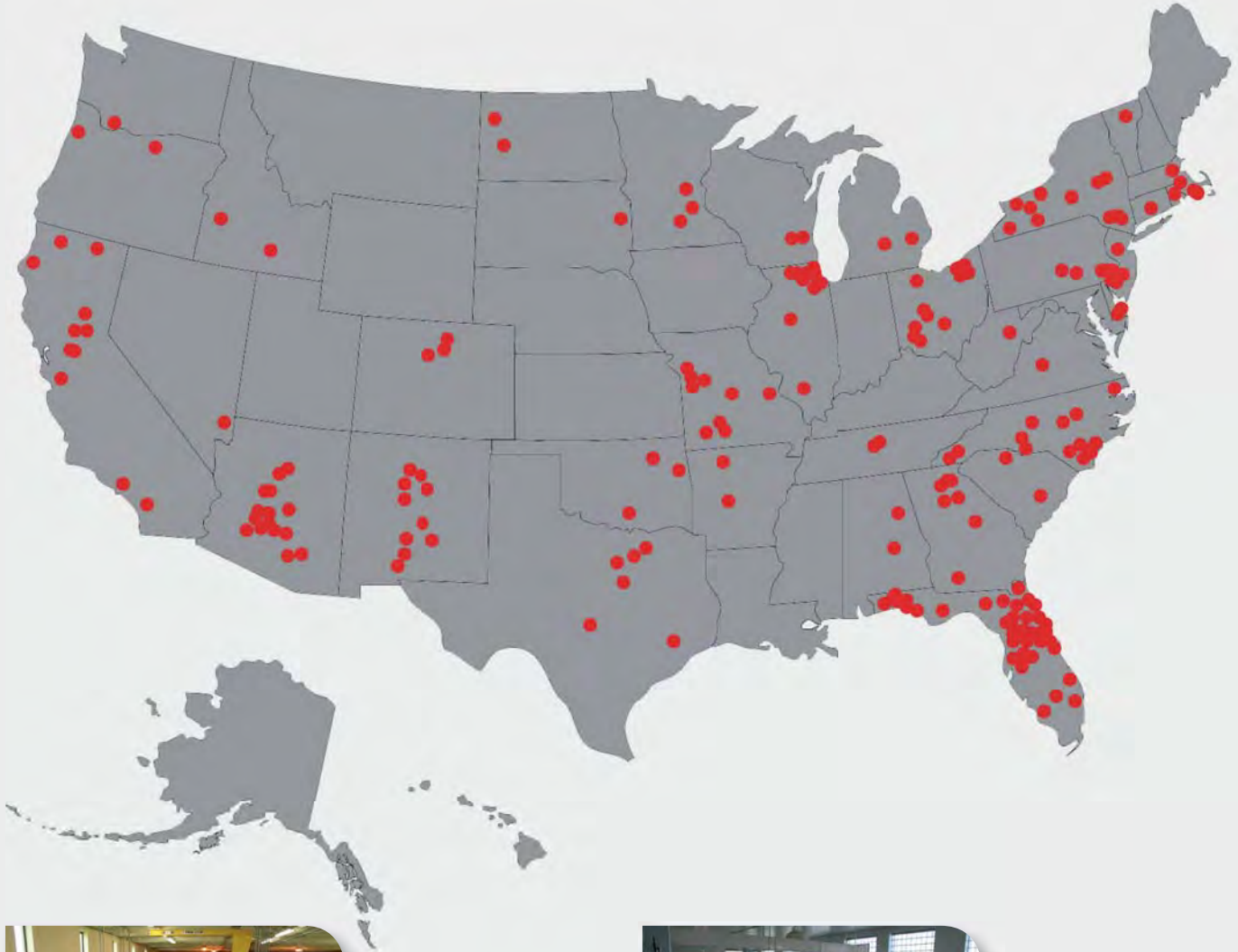
O&M is simple and reduces operating costs. Fabrication is in 304 or 316 SSTL for trouble-free operation in the toughest conditions. Durable filter media provides long life without frequent and costly replacement. The efficient backwash process reduces energy costs.



Hydrotech Discfilters are easy to inspect and maintain, saving time and money.

Experience You Can Trust

Today's demanding applications require proven experience. Hydrotech Discfilters lead the market with over 400 installed units in the United States and over 1,900 worldwide.



Oconomowoc, WI

Retrofit of tertiary
sand filters
12 MGD



Fox Lake, IL

Retrofit of tertiary
sand filters
30 MGD



Mesquite, TX

Effluent polishing
48 MGD



Holly Springs, NC

Water reclaim and
phosphorus removal
15 MGD

