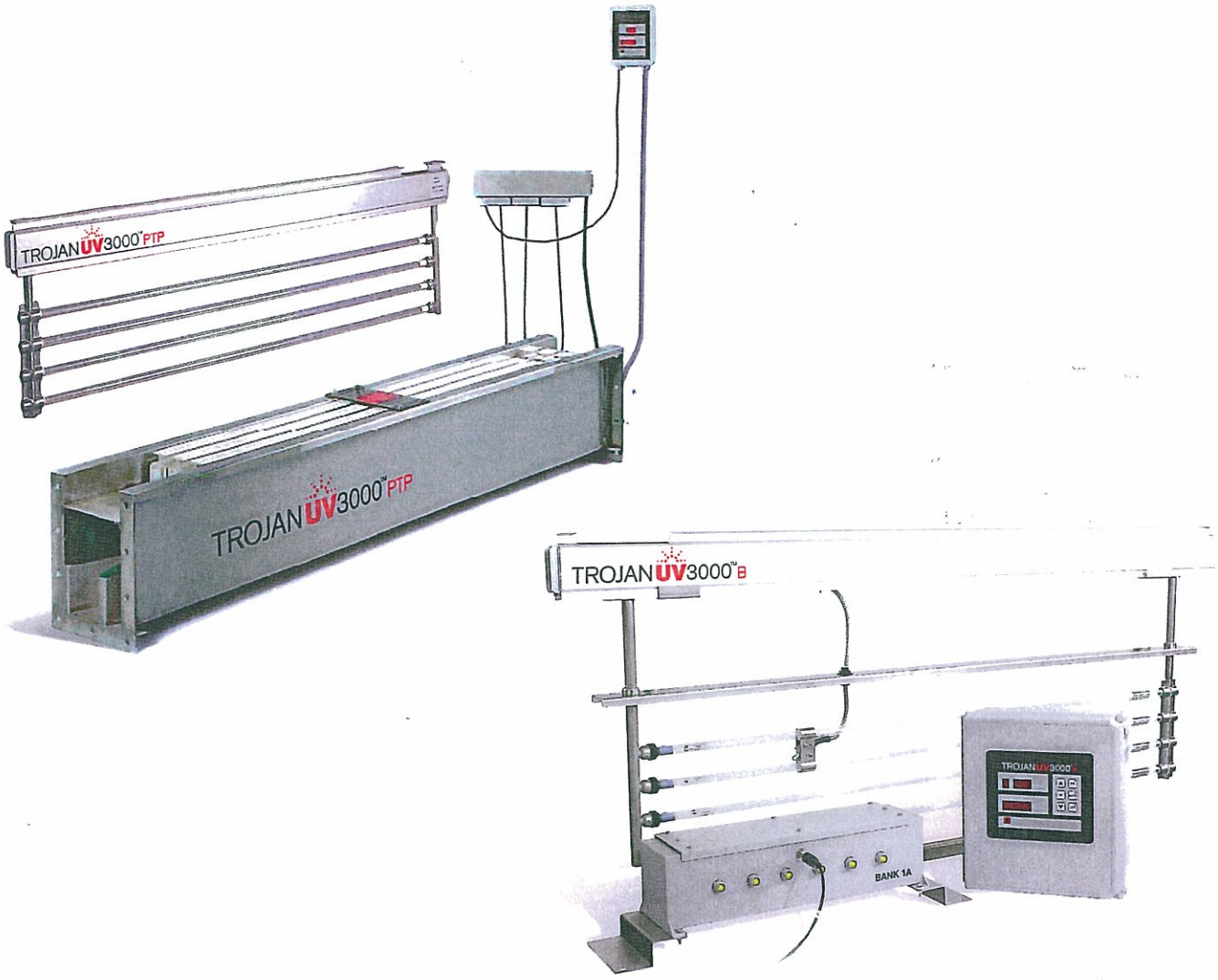
Appendix O

TROJAN UV3000™ PTP | TROJAN UV3000™ B

WASTEWATER DISINFECTION



Simple, Dependable UV Solutions

Proven, chemical-free disinfection from the industry leader

Trojan Technologies Inc. is an ISO 9001: 2000 registered company that has set the standard for proven UV technology and ongoing innovation for more than 25 years. With unmatched scientific and technical expertise, and a global network of water treatment specialists, representatives and technicians, Trojan is trusted more than any other firm as the best choice for municipal UV solutions. Trojan has the largest UV installation base – over 4,000 municipal installations worldwide.

In North America alone, almost one in five wastewater treatment plants rely on our proven, chemical-free disinfection solutions.

The TrojanUV3000™PTP (Packaged Treatment Plant) and TrojanUV3000™B are two of the reasons why. These simple, robust, and operator-friendly systems have demonstrated their effective, reliable performance in over 1,000 installations around the world. The TrojanUV3000™PTP is pre-engineered for quick, inexpensive installation with pipe runs using pre-fabricated, flanged stainless steel channels, or into existing chlorine contact basins and effluent channels. The TrojanUV3000™B offers increased capacity and is available with a controller that enables flow pacing to maximize operating efficiency and extend lamp life. The system turns UV lamp banks on and off automatically to ensure the required dose is met using the fewest lamps and least electricity.

TROJANUV3000™PTP | TI llast

Robust, operator-friendly solutions designed

TP/B

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P65)-rated watertight
module frame, and
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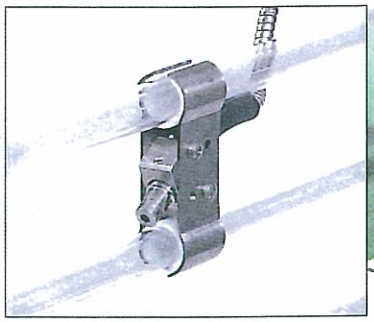
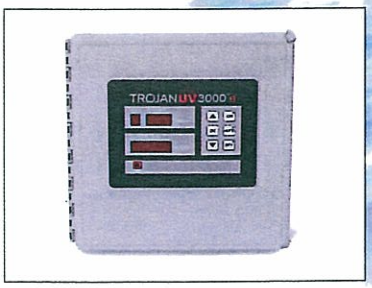
System Monitor/Control Center



TrojanUV3000™PTP – Optional

The optional System Monitor includes a submersible UV sensor, and provides digital output of UV intensity at each bank. Elapsed time display provides continuous readout of actual hours of operation (lamp hours). A dry contact enables a remote low UV intensity alarm.



TrojanUV3000™B

The System Control Center (SCC) provides control of all UV functions, tracks lamp hours, and uses a submersible UV sensor (one per bank) to monitor UV intensity. The SCC is capable of "flow pacing" – automatically turning banks of UV lamps off or on in response to changes in the flow rate in order to conserve power and prolong lamp life.

ution

PTP

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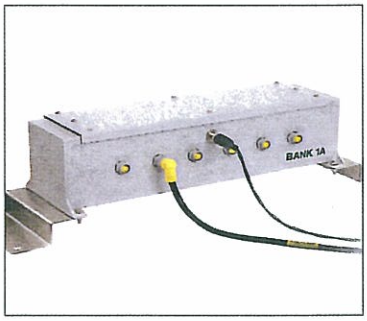

TrojanUV3000™B

The Power Distribution Center (PDC) is constructed of fiberglass and is mounted across the channel. The PDC distributes power to individual modules and allows electrical isolation of each module for easy service.

PTP/B

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amp status is provided
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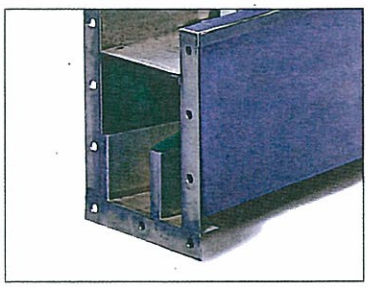
Stainless Steel Effluent Channel



TrojanUV3000™PTP - Optional

An optional Type 304 stainless steel channel, complete with UV Module Support Rack, can be used. Channel can be installed as a freestanding structure connected to flanged pipes using the optional transition boxes.

Key Benefits

TrojanUV3000™PTP / TrojanUV3000™B

Increased operator, community and environmental safety.
The TrojanUV3000™PTP and TrojanUV3000™B use environmentally friendly ultraviolet light – the safest alternative for wastewater disinfection. No disinfection by-products are created, and no chlorine compounds must be transported, stored or handled by plant staff.

Proven disinfection based on actual dose delivery testing (bioassay validation), and over 1,000 TrojanUV3000™PTP and TrojanUV3000™B installations worldwide. Verified field performance data eliminates sizing assumptions resulting from theoretical dose calculations.

Reduced engineering and installation costs. The TrojanUV3000™PTP can be equipped with pre-fabricated stainless steel channels and transition boxes for in-line integration with existing flanged piping – thus minimizing engineering and installation costs. Both systems can be easily retrofitted into existing chlorine contact tanks and effluent channels, and come pre-tested, pre-assembled and pre-wired to minimize installation costs.

Designed for simplicity and reliability. Using Trojan's most proven, modular design and robust components, including low-pressure lamps, these systems are straightforward to operate and require minimal operator involvement.

Operator-friendly maintenance. Trojan lamps are guaranteed for 12,000 hours (15 months) of operation, and can be replaced, without tools, in less than three minutes per lamp. Modules are electrically separate, allowing a single module to be removed without disrupting flow or taking the system off-line.

Outdoor installation flexibility. All components of the TrojanUV3000™PTP and TrojanUV3000™B systems can be installed outdoors, eliminating the need and costs of a building, shelter, and air conditioning for ballast cooling.

Well suited to changing regulations. Trojan UV systems do not have any negative impact on receiving waters, making them a strategic, long-term choice as regulations become increasingly stringent.

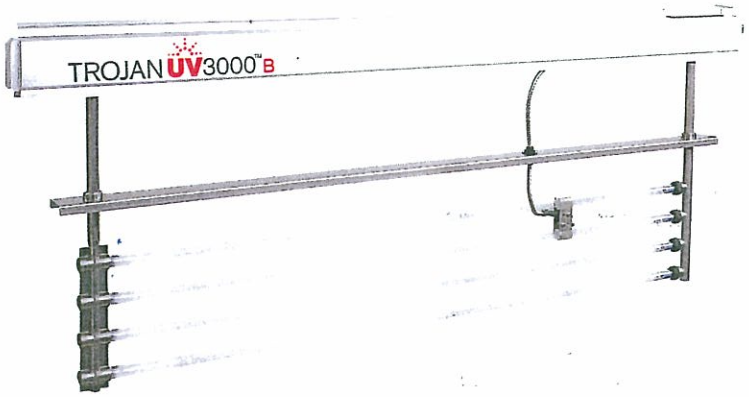
Guaranteed performance and comprehensive warranty. Trojan UV systems include a Lifetime Disinfection Performance Guarantee, the best lamp warranty in the industry, and offer lamps from multiple approved suppliers. Ask for details.

Advanced, Self-Contained UV Modules

Compact footprint simplifies installation and eliminates air conditioning costs

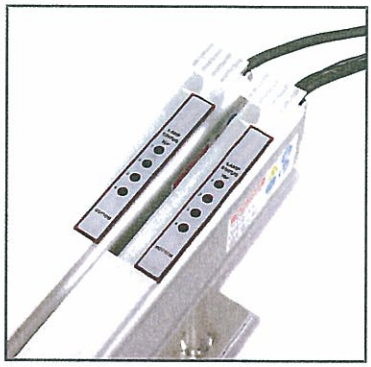
Benefits:

- Space-saving, electronic ballasts are housed right in the modules, not separate external cabinets, to minimize footprint size, installation time and costs
- Convection cooling of the ballast eliminates costs associated with air conditioning or forced-air cooling
- Lamps are protected in a fully-submersible, Type 316 stainless steel frame
- All wiring and cables are safely enclosed inside the waterproof module frame – fully protecting them from effluent and UV light
- Modules are electrically separated from each other, allowing them to be individually removed for maintenance and a spare module quickly inserted to maintain maximum performance



The advanced, self-contained modules of the TrojanUV3000™PTP and TrojanUV3000™B incorporate convection-cooled ballasts and feature a UV lamp status indicator (below) for at-a-glance confirmation that all lamps are operating.

- Streamlined module minimizes headloss and prevents build-up of debris on the lamps
- All module wiring is pre-installed and factory-tested



Trojan's Innovative Ballasts and Enclosures Provide Significant Advantages

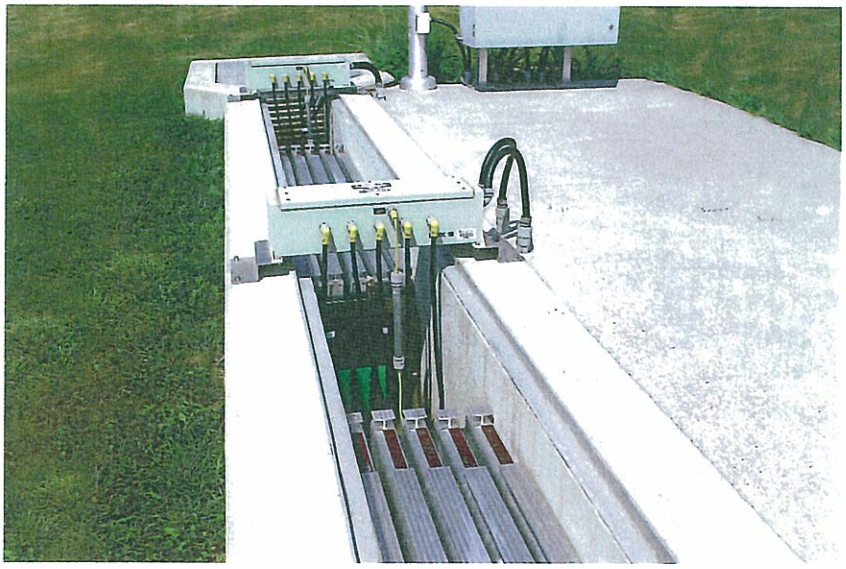
Module-Mounted Ballasts	▪ Take up less space and reduce footprint, minimizing installation time and costs
Convection Cooling	▪ Housing the ballasts in the module allows for natural convection cooling to dissipate the heat of the ballasts into the air ▪ The ballasts are kept sealed and protected ▪ No air conditioning or forced-air cooling required
Clean, Water-Tight Protection	▪ Some suppliers use external cabinets with forced-air cooling. This introduces dust and moisture onto circuit boards and other electronic components, greatly reducing the life of these components ▪ Internal housing in Trojan's sealed module keeps all components dry and clean
Internal Cabling	▪ All lamp-ballast wiring is contained within the module frame. This configuration protects wires and cables from exposure to effluent, debris fouling and UV light ▪ Internal cabling allows all electrical connections within the module to be factory-tested

Proven Performance, Components and Design

Validated through regulatory-endorsed bioassay testing and over 1,000 installations worldwide

Benefits:

- Performance data is generated from actual field testing (bioassay validation) over a range of flow rates, effluent quality and UVTs
- Provides regulatory-endorsed, physical verification that systems will perform as expected – ensuring public and environmental safety
- Most accurate assessment of system sizing needs
- Low-pressure lamps and ballasts have proven their outstanding reliability in thousands of installations
- Open-channel design allows cost-effective installation into existing effluent channels & chlorine contact basins
- Systems can be installed outdoors to reduce building capital costs
- Modular design is scalable for precise sizing, and expandable to meet new regulatory or capacity requirements



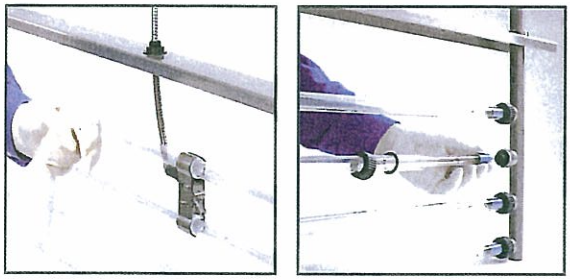
The TrojanUV3000™PTP and TrojanUV3000™B feature a gravity-fed, open-channel design that delivers cost savings at installation through simple retrofits into existing effluent channels and chlorine contact tanks. Rugged, proven components make operation and maintenance extremely cost-effective.

Designed & Built for Easy Maintenance

User-friendly design requires minimal service and operator involvement

Benefits:

- Trojan lamps are warranted for 12,000 hours (15 months)
- Routine maintenance can be scheduled and completed without disrupting disinfection
- Replacement of UV lamps can be completed without tools and requires less than 3 minutes per lamp



Lightweight, self-contained modules are operator-friendly and make routine maintenance quick and easy. Modules can be individually removed for periodic sleeve cleaning and lamp replacement after 12,000 hours (15 months). An optional, mobile cleaning rack simplifies maintenance procedures.

Highly Flexible Installation Configurations

TrojanUV3000™PTP is pre-engineered for cost-effective integration with piping or channels

Benefits:

- Systems are pre-designed to meet disinfection requirements with minimal engineering costs
- Systems can be installed in series to treat higher flows or provide additional redundancy
- Pre-engineered stainless steel channels with built-in weirs are installed as a freestanding structure
- Stainless steel channels are easily integrated with existing flanged piping using Trojan's highly flexible transition boxes (Figure 1)
- Optional turn boxes minimize system footprint by connecting stainless steel channels and allowing two banks in series to be installed side-by-side (Figure 2)
- Transition boxes allow flanged pipe connection on any of three sides for flexible integration (Figure 3)

Figure 1: Banks in Series – Side View

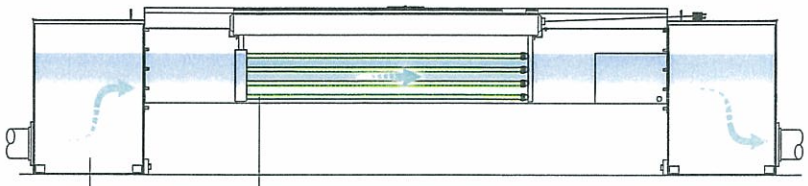


Figure 2: Banks in Series With Turn Box – Overhead View

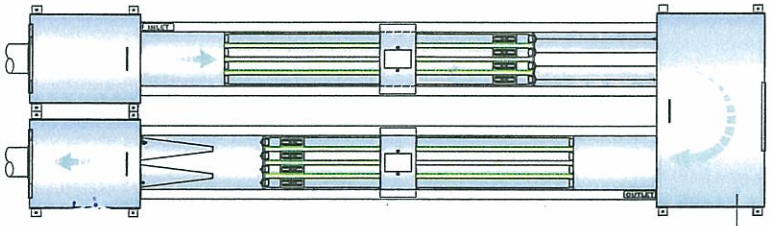
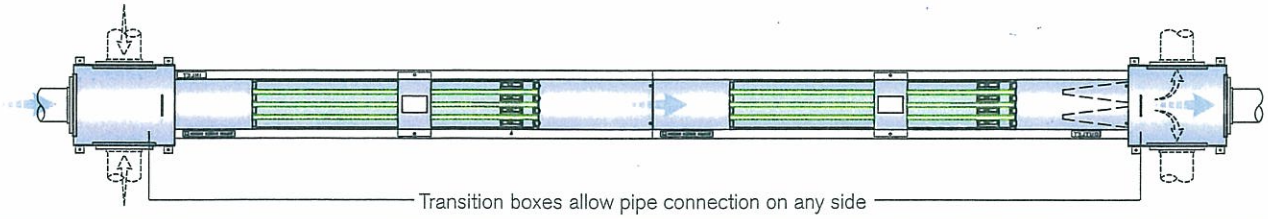


Figure 3: Banks in Series – Overhead View



The TrojanUV3000™PTP is pre-engineered for simple, effective, low cost wastewater disinfection. The optional 304 stainless steel channels feature a UV module support rack, and can be installed as a freestanding unit. Trojan turn boxes and transition boxes allow systems to be incorporated with maximum flexibility and minimal footprint.

Flow Pacing Reduces O&M Costs

TrojanUV3000™B system controller offers flow-pacing for increased operating efficiency

Benefits:

- The System Control Center (SCC) provides monitoring and control of all UV functions
- The SCC provides digital display of bank status, lamp hours, and UV intensity (mW/cm^2)
- The SCC allows the TrojanUV3000™B to be flow paced – meaning the UV lamps of individual banks are turned on and off automatically in response to variations in flow rate (based on a flow meter signal)
- Flow pacing maximizes operating efficiency by matching UV output to disinfection requirements, and reducing electrical consumption during periods of low flow by turning lamps off (Figures 1 & 2)
- Flow pacing also increases the operating life of UV lamps, thereby reducing the frequency, expense and labor required for lamp replacement

The System Control Center of the TrojanUV3000™B monitors lamp hours and uses a submerged UV Sensor to feed accurate data on UV intensity for at-a-glance system status. The SCC also allows flow pacing to minimize operating and maintenance costs by turning banks on and off based on flow requirements

Flow Pacing Optimizes System Efficiency

Figure 1: Operation During Periods of High Flow

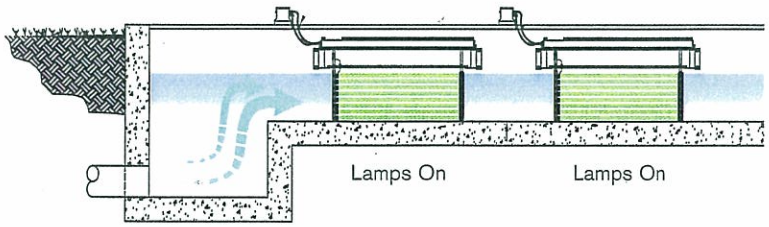
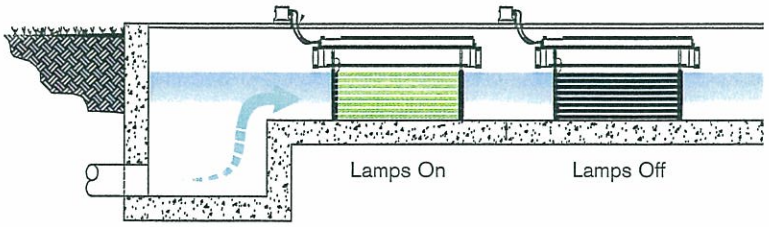


Figure 2: Operation During Periods of Low Flow



TROJAN UV3000™ PTP | TROJAN UV3000™ B

System Specifications		
System Characteristics	TrojanUV3000™PTP	TrojanUV3000™B
Typical Applications	Up to 3 MGD (473 m³/hr)	1 – 5 MGD (158 – 789 m³/hr)
Lamp Type	Low-pressure	
Ballast Type	Electronic; non-variable	
Input Power Per Lamp	45 or 87.5 Watts	87.5 Watts
Lamp Configuration	Horizontal, parallel to flow	
Module Configuration	2 or 4 lamps per module	4, 6 or 8 lamps per module
Bank Configuration	Up to 10 modules per bank	Up to 20 modules per bank
Channel Configurations		
Lamp Banks in Series	Up to 2	Up to 3
Channel Options	Stainless Steel (Trojan option) or Concrete (by others)	Concrete (by others)
Flanged Transition Connections	Optional for stainless steel channels	—
U-Turn Connector Box	Optional for stainless steel channels	—
Level Control Device Options	Fixed weir	ALC gate or fixed weir
Enclosure Ratings		
System Monitor/Control Center	Fiberglass (3R)	
Ballast Enclosure	TYPE 4X (IP65)	
Ballast Cooling Method	Convection; no air conditioning or forced air required	
Installation Location	Indoor or outdoor	
System Monitoring & Controls		
Controller	Optional; Monitoring only	Monitoring and bank control
UV Intensity Monitoring	Optional	Optional
Flow Pacing	—	Optional
Inputs Required	None	4-20 mA flow signal for Flow Pacing
Local Status Indication	Lamp Age (hours) UV Intensity (mW/cm²) Bank Status (on/off) Low Intensity Alarm Lamp Failure Alarm	
Remote Alarms	UV Intensity (4-20 mA) Common Alarm (discrete)	
Location	Indoor or outdoor	
Maximum Distance from UV Channel	15 ft (4.5 m)	20 ft (6 m)
Electrical Requirements		
Power Distribution	Individual GFI Receptacles	Power Distribution Centre
Quantity Required	1 receptacle per 2 modules	1 PDC per bank
Power Input	120V, single phase	120V, single phase 208V, 3-phase 240V, single phase

Find out how your wastewater treatment plant can benefit from the TrojanUV3000™PTP or TrojanUV3000™B system – call us today.

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TROJAN UV
WATER CONFIDENCE™

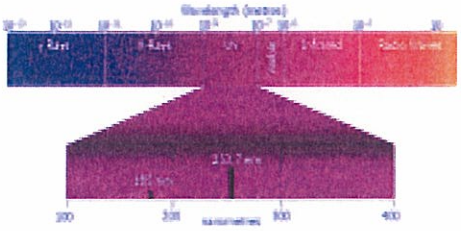
AQUIONICS
World Leader in Ultraviolet Technology

ULTRAVIOLET TECHNOLOGY

What is Ultraviolet Light

Close to a century ago, scientists first identified that part of the electromagnetic spectrum responsible for the bactericidal effect of sunlight. The most biologically disruptive frequencies causing this well-known effect are the shorter wavelengths within ultraviolet (UV) light known as the UV-C spectrum. This spectrum ranges from 200nm to 300nm (one-billionth of a meter).

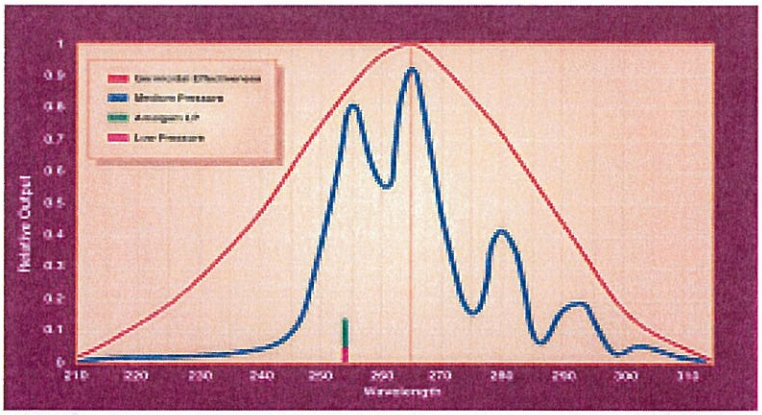
The Electromagnetic Spectrum



How is UV Light Generated?

The UV lamp, a quartz tube similar to a standard fluorescent bulb with electrodes at each end, is filled with an inert gas and a minute amount of mercury. Electrical energy, applied across the electrodes, provides the initial discharge And means of exciting the gases present. With relatively small amounts of energy input, a "Low Pressure" glow is created which produces UV emissions at 185nm and 254nm.

As the electrical input energy is increased, the lamp heats up rapidly; causing the internal pressure to increase, producing the characteristic "Medium Pressure" spectrum shown. The high output of the medium pressure lamp is a result of a complex combination of atomic spectral, continuum and absorption lines characteristic of mercury vapor.



Low Pressure UV ...

Typical Low-Pressure (LP) lamps operate between 120V and 240V, similar to standard fluorescent bulbs. These lamp types obtain power outputs ranging from 40 to over 100 Watts with current draws of less than 500mA. These low-pressure UV lamps are manufactured of quartz with two electrodes. They operate with very low (vacuum) internal pressures between 10^{-3} to 10^{-2} Torr and optimum operating temperatures of 110°F at the lamp surface. The mercury inside is partially vaporized raising the mercury atoms to low orbital energy states with subsequent emission of one distinct wavelength within the UV spectrum, at 254nm which is often referred to as monochromatic, and for this reason MP lamps are often referred to as polychromatic.

Medium Pressure UV ...

Medium Pressure (MP) lamps have higher (nearly atmospheric) operating pressures between 10^2 and 10^4 Torr with surface temperatures up to 1500°F. Under these conditions, the mercury completely vaporizes creating a plasma with temperatures that can reach 10,000°F. In this plasma, mercury atoms are excited to multiple high orbital levels which, upon collapse, produce the characteristic broad spectral emission. Many of the performance features of MP lamps are derived from these fundamental differences in operation. Medium pressure lamps are stable under all temperature conditions and the broad spectral output results in a diverse range of applications not possible with low pressure.

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Specifying Ultraviolet Equipment

To specify the most appropriate UV system for each application and ensure that the correct UV dose is applied, there are a number of critical parameters that must be determined.

UV Dose

The UV dose is the energy delivered to a given surface area for a given period of time and can be calculated by the formula:

Dose (mJ/cm^2) = Intensity (mW/cm^2) x Time (sec)
(1 w-sec = 1 *Joule*)

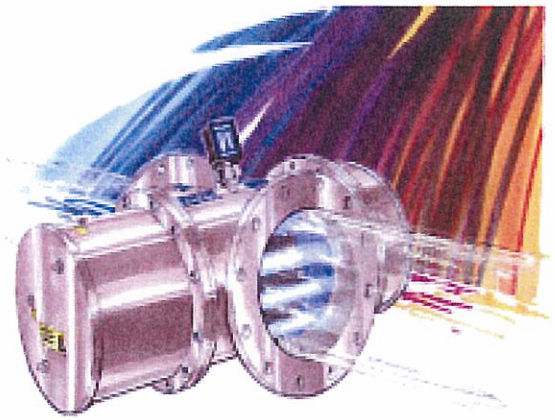
The intensity is determined by the UV lamp power and water quality. The time is determined by the period which the process fluid is exposed to the UV (residence time). Aquionics will recommend the appropriate UV dose for each application, taking into account all critical factors including: water quality, temperature, and disinfection requirements.

UV Dose mJ/cm^2	Reduction in CFUs
5.4.1	99.00% (1-log)
10.8	99.00% (2-log)
16.2	99.90% (3-log)
21.6	99.99% (4-log)

Table 1 *Dose/Kill-Rate Relationship for E. Coli in Water.* A commonly used indicator organism for measuring contamination of municipal wastewater supplies.

Water Temperature

Low pressure UV lamps have an optimum operating temperature of 110°F which is maintained when process water in the chamber is approximately 70°F. Low pressure UV output drops rapidly if process water temperature rises above or drops below this optimum temperature. The UV output of medium pressure lamps remains unaffected by water temperature due to its higher operating temperature.



Flow Rate

Flow rate is a critical factor effecting the residence time, that an organism undergoes. There is a linear relationship between dose and flow rate. Typical disinfection systems are rated at the *maximum* flow which will deliver a 25 mJ/cm^2 dose at the end of a lamp's usable life.

Water Quality

Effective UV dose is dramatically effected by water quality and constituents of water that absorb ultraviolet light. UV transmission through water decreases as the level of organic and inorganic contamination increases. Consequently, additional UV energy is required to treat the fluid. The most important factors in determining water quality and UV transmission are color, metals, organic matter, suspended and dissolved solids, and turbidity.

How Does UV Destroy Microorganisms?

High-energy ultraviolet light will pass easily through cell walls, cytoplasm, and nuclear membranes. Here, the photons are readily absorbed by the cellular DNA (the reproductive material). This UV energy causes permanent, irreparable, inactivation of the microorganism by fusing together and forming dimmers within portions of the DNA strands prohibiting replication. The microorganism becomes unable to maintain metabolism or reproduce itself and subsequently perishes. All cells, when subjected to germicidal UV, undergo a similar processes:

- Ultraviolet light penetrates the cell wall
- UV photons are absorbed by cellular DNA.
- DNA is permanently altered ceasing any capability for reproduction.
- Organisms, unable to metabolize or reproduce, perish and become unable to cause disease or spoilage.

The D10 Concept

The *D10* value for a microorganism is defined as the UV dose necessary to effect a 90% reduction in Colony Forming Units (CFUs). The relationship between dose and kill-rate is logarithmic. For example, if a 99.99% kill-rate of a particular organism is desired, the necessary dose is determined by multiplying the *D10* value by four (4).

Other Pathogenic Organisms	*D10 Value (mJ/cm2)*
Fecal Coliform	5-6
Escherichia Coli	5-6
Enterococcus	10
Streptococcus viridians	2
Salmonella enteritidis	7-8
Bacillus subtilis (spores)	12
Bacillus anthracis (spores)	9
Polio Virus	6-7
Aspergillus niger	130
Tuberculosis bacillus	10

Table 2 Typical D10 values of common microorganisms. Different types of organisms require different UV doses to achieve a 90% kill-rate.

Ultraviolet Light for PHOTOLYSIS

Disinfection is just one example of a broad range of photochemical effects of UV energy. Just as UV damages DNA in living organism, it also affects many other chemical bonds. Different bonds are affected at different UV wavelengths. The chemical effects of UV include:

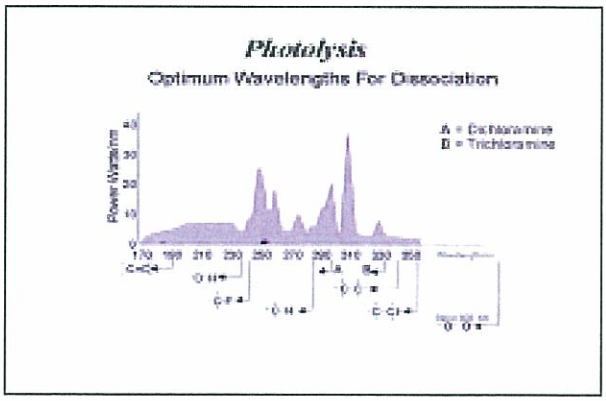
- Emission of high-energy photons which break molecular bonds.
- Conversion of non-ionic organic molecules into charged species capable of ion exchange removal.
- Production of hydroxyl radicals (OH^-) which oxidize certain molecular bonds causing photochemical breakdown.

The process of breaking chemical bonds with UV is called *Photolysis.* The principles of photolysis state that only light which is absorbed by a particular molecule can be effective in producing a photochemical change, and the photon energy absorbed must be sufficient to overcome the bonding forces to result in molecular photolysis.

Photolytic Applications

Possibilities for the use of UV to breakdown chemicals are limitless. Listed are several common applications:

- Total Organic Carbon (TOC) reduction for the production of high-purity water
- Destruction of pesticides or other contaminants in water supplies
- Chlorine and chloramine removal
- Destruction of NDMA
- Destruction of residual ozone after disinfection and sanitation
- Destruction of chemical contaminants in industrial wastewater streams



Why Choose Ultraviolet Technology for Disinfection and Photolysis?

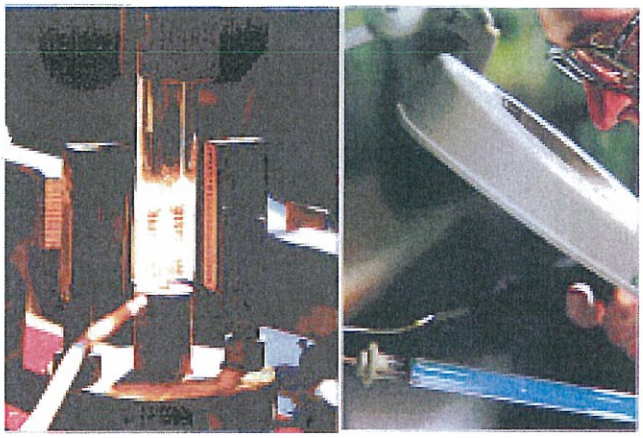
The use of chemicals to disinfect and breakdown contaminants is declining because of the short and long term damaging effects on humans, products, processes, and the environment. Traditionally, chemicals have been the accepted method of disinfection municipal effluents.

Ultraviolet disinfection is chemical-free and does not alter the composition, resistivity, or pH of the water. UV provides an alternative solution to the need for expensive dechlorination systems and completely eliminates the handling and use of any hazardous chemicals.

Advantages of UV include:

- Environmentally safe
- High-efficiency
- Low capital and operating costs
- Impossible to overdose
- Nothing added to alter fluid being treated

Important Factors	*Ultraviolet*	*Ozone*	*Chlorine*
Alters pH	No	Yes	Yes
Temperature Sensitive	No	Yes	Yes
Residual	No	Yes	Yes
Contact Time	Very Short	High	High
Operator Skill	Low	High	High
Maintenance	Low	High	Medium
Ammonia Interference	No	Yes	Yes
Water Chemistry	No Effect	Yes	Yes
Capital Cost	Low	High	Medium
Operating Cost	Low	High	Medium



Aquionics UV Systems Can Treat:

- Municipal or private wastewater and drinking water
- Re-use and regeneration water for golf courses and public access
- Contaminant removal such as NDMA or MTBE and ASR
- Groundwater recharge
- Combined Sewer Overflows (CSO) & Storm Sewer Overflows (SSO)
- Water for industrial processes

Why Choose Aquionics?

Aquionics is the world leader in Ultraviolet Technology…

- Aquionics, in conjunction with its global divisions in the UK and The Netherlands, offers experience since 1924 in the development, manufacture, and application of UV equipment supplied to all corners of the globe.
- Worldwide service and custom design capabilities
- All UV technologies available from a single supplier.

Aquionics manufactures its own UV lamps…

- Medium pressure lamps
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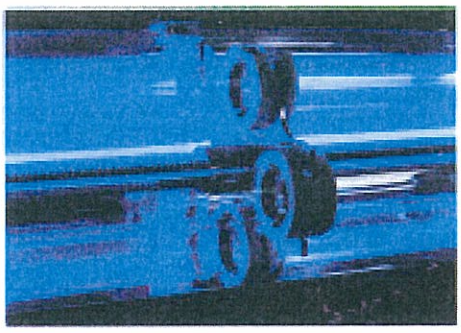
- Each lamp is individually inspected



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PARKSON CORPORATION
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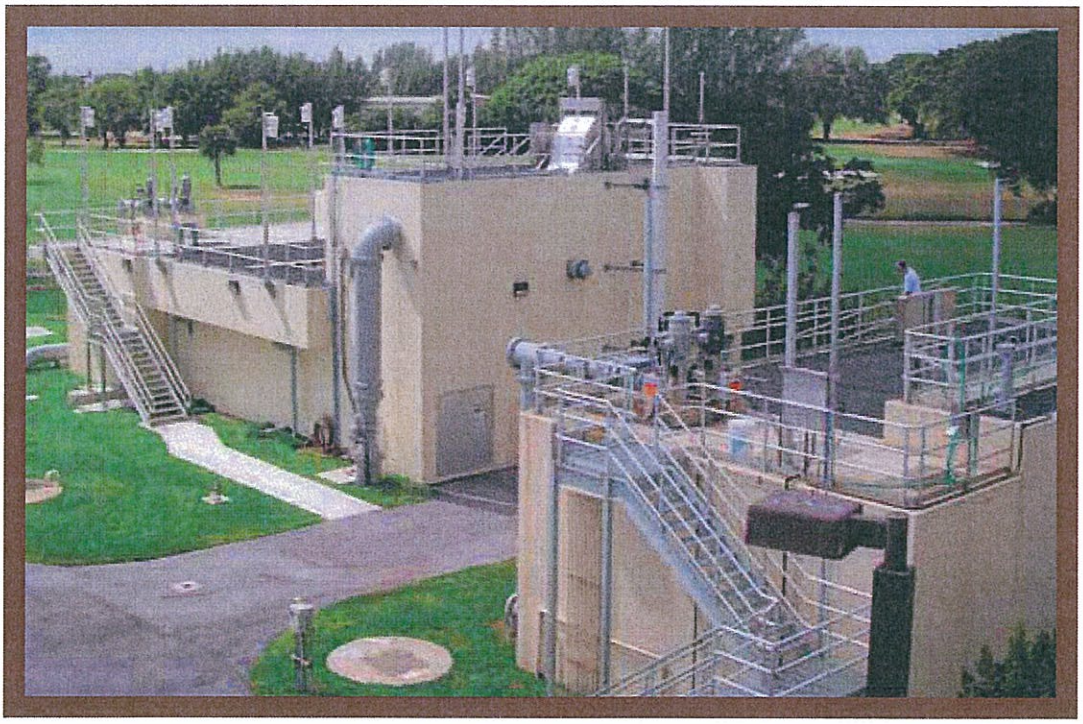
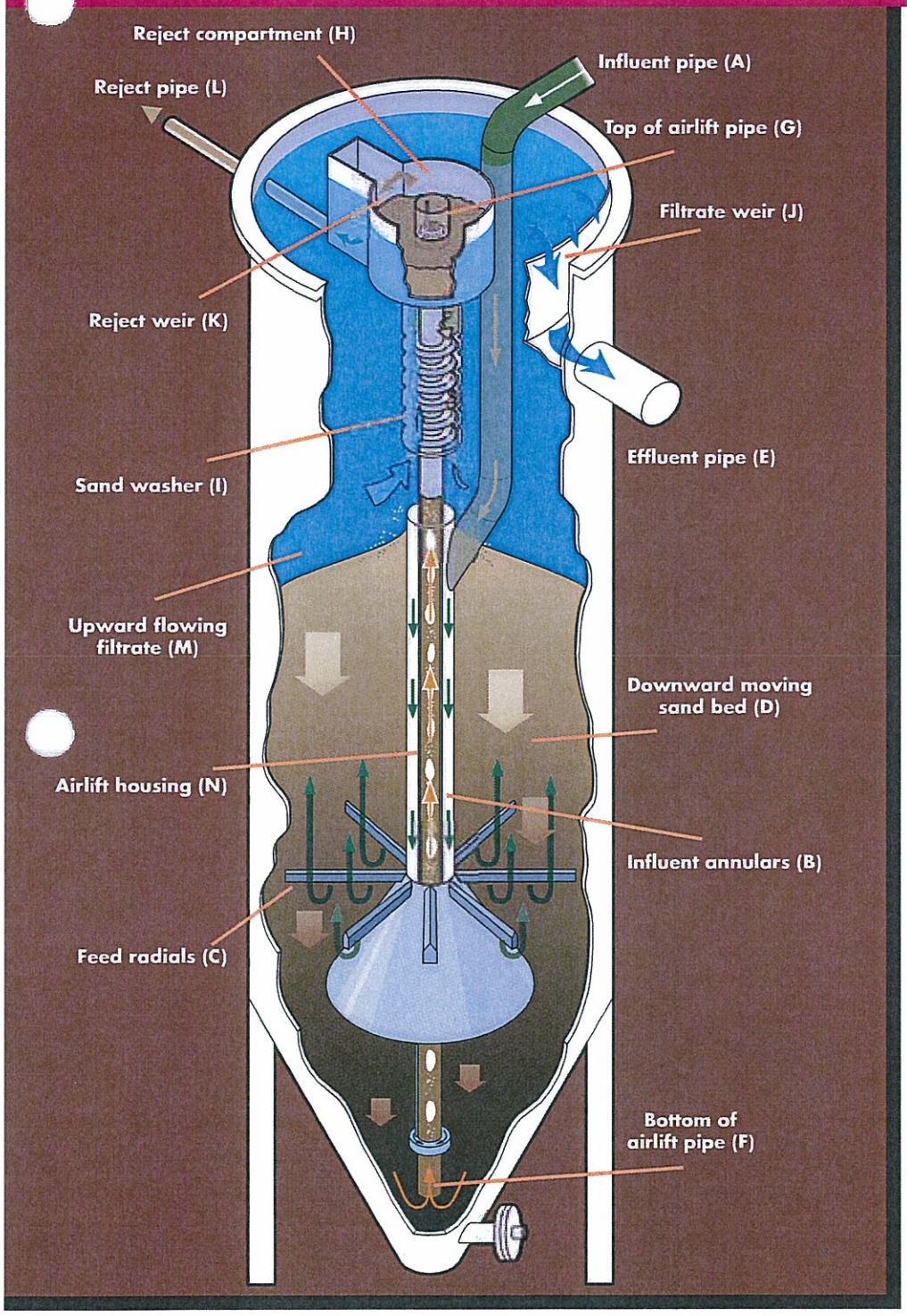
DYNASAND®

CONTINUOUS, UPFLOW, GRANULAR MEDIA FILTER



The DynaSand® Filter

Simplicity, low maintenance, outstanding performance



The DynaSand filter is an upflow, deep bed, granular media filter with continuous backwash. The filter media is cleaned by a simple internal washing system that does not require backwash pumps or storage tanks. The absence of backwash pumps means low energy consumption.

The DynaSand filter's deep media bed allows it to handle high levels of suspended solids. This heavy-duty performance may eliminate the need for pre-sedimentation or flotation steps in the treatment process in some applications.

The DynaSand filter is available in various sizes and configurations. This flexibility allows for customization to fit specific site and application requirements.

DynaSand Principles of Operation

Influent Filtration Influent feed is introduced at the top of the filter (A) and flows downward through an annular section (B) between the influent feed pipe and airlift housing. The feed is introduced into the bottom of the sand bed through a series of feed radials (C) that are open at the bottom. As the influent flows upward (M) through the downward moving sand bed (D), organic and inorganic impurities are captured by the sand. The clean, polished filtrate continues to move upward and exits at the top of the filter over the filtrate weir (J) and out through the effluent pipe (E).

Sand Cleaning The sand bed containing captured impurities is drawn downward into the center of the filter where the airlift pipe (F) is located. A small volume of compressed air is introduced at the bottom of the airlift, drawing the sand into the airlift pipe. The sand is scoured within the airlift pipe at an intensity of 100-150 SCFM/ft². The effectiveness of this scouring process is vastly greater than what can be expected in conventional sand filtration backwash. The scouring dislodges any solid particles attached to the sand grains.

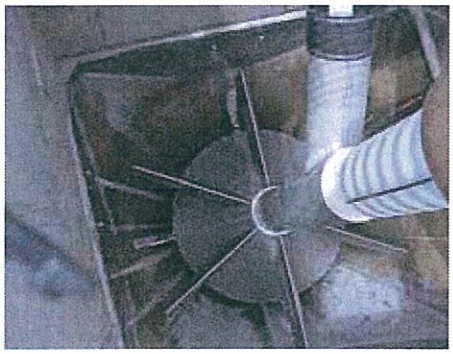
The dirty slurry is pushed to the top of the airlift (G) and into the reject compartment (H). From the reject compartment, the sand falls into the sand washer (I) and the lighter reject solids are carried over the reject weir (K) and out the reject pipe (L). As the sand cascades down through the concentric stages of the washer, it encounters a small amount of polished filtrate moving upward, driven by the difference in water level between the filtrate pool and the reject weir. The heavier, coarser sand grains fall through this small countercurrent flow while the remaining contaminants are carried back up to the reject compartment. The clean, recycled sand is deposited on the top of the sand bed where it once again begins the influent cleaning process and its eventual migration to the bottom of the filter.

DynaSand® Filter Configurations

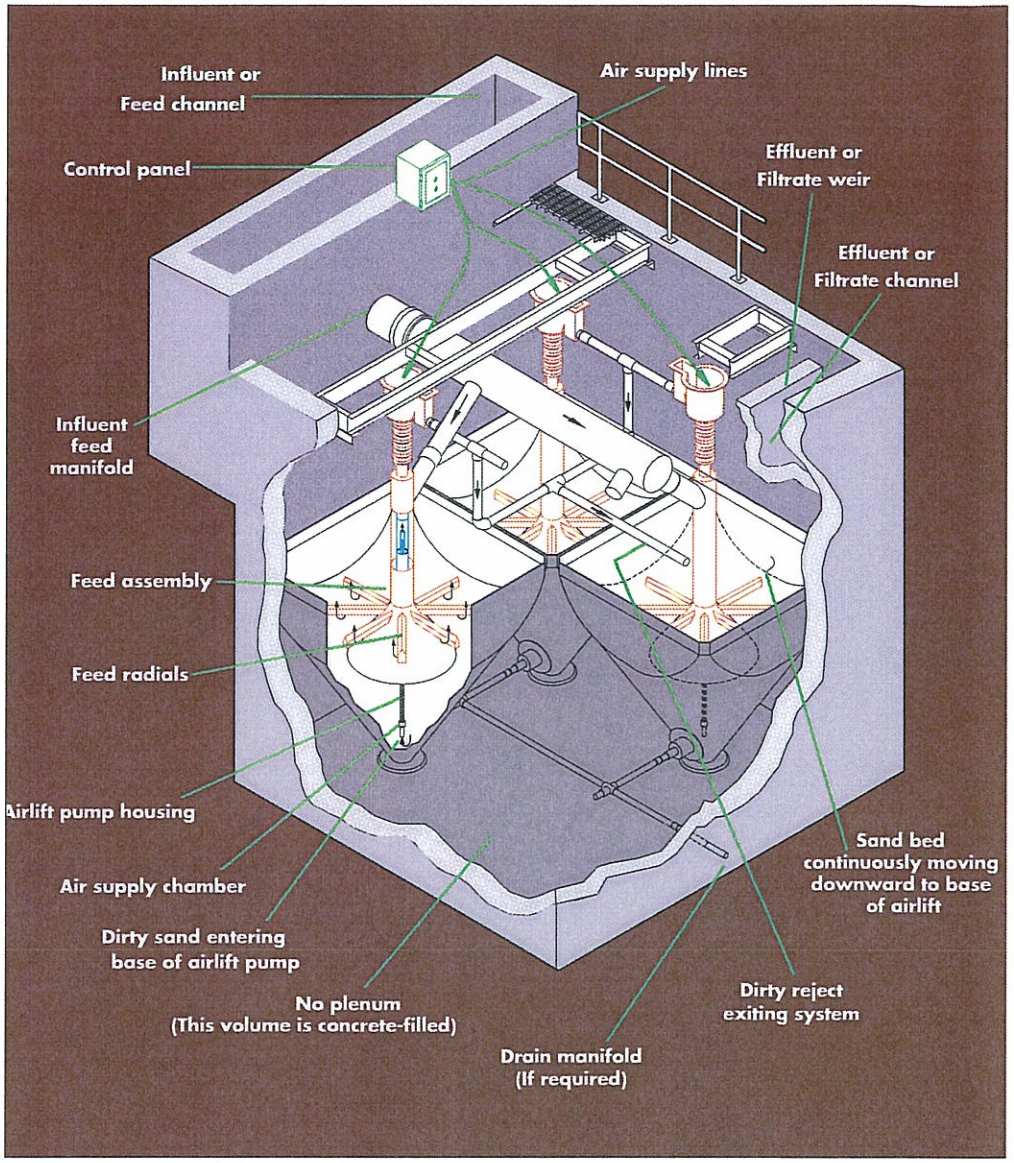
The DynaSand filter is available as either stand alone package units or in a modular concrete design. The package units are constructed of either 304 SST or FRP. Materials of construction for the internal components of both package and concrete units are SST and/or FRP. Filters are available in 40" standard bed or 80" deep-bed design depending on the nature of the application. Concrete modules are frequently used for high flow capacity systems by placing multiple modules into a common filter cell. The modules in a filter cell share a common filter bed where cones at the bottom of each module distribute sand to their respective airlifts and sand washers.

DynaSand Filter above ground package units

A concrete DynaSand installation can be designed for any size filter area. This enables the technology to be applied to any size water or wastewater treatment plant. Since all filter beds are being continuously cleaned, the pressure drop remains low and even throughout all the filters. Equal pressure drop ensures even distribution of feed to each filter without the need for splitter boxes or flow controls. Therefore, a typical multiple unit installation can use a common header pipe with feed connections and isolation valves for each filter.



DynaSand Filter modules in concrete basin

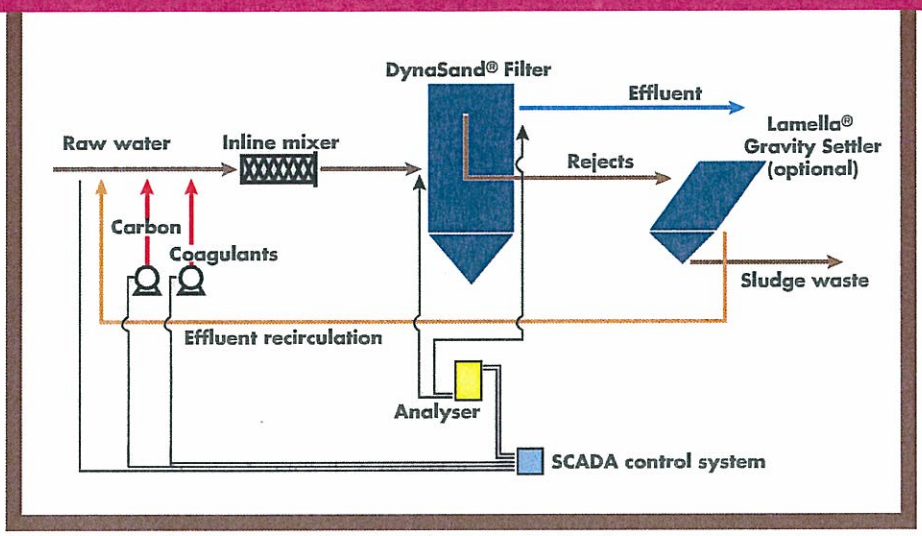


Features	Benefits
Continuously Cleaned Sand Bed	**No shutdown for backwash cycles** **Elimination of ancillary backwash equipment** **No flow control valves, splitter boxes, or backwash controls**
No Underdrains or Screens	**No short-circuiting**
Sand Washed with Filtrate	**Optimum sand-washing efficiency** **Superior filtrate quality**
No Level Control	**Reduced operator attention** **Minimizes overall pressure-drop**
Internal, Vertical Airlift	**Reduces potential for pluggage** **Significantly reduces wear/maintenance** **Can be easily maintained without filter shutdown**
Low Power Requirements	**Up to 70% less compressed air vs. other self-cleaning filters**

DynaSand® Filter Continuous Contact Filtration Process

Water and wastewater treatment in conventional plants typically involves flocculation, clarification and filtration. Direct filtration eliminates clarification but still requires flocculation. The DynaSand filter utilizes a proprietary process known as Continuous Contact Filtration. The DynaSand filter's 80" media bed depth provides greater hydraulic residence times and more opportunity for floc formation and attachment. Thus, coagulation, flocculation and separation can be performed within the sand bed, eliminating the need for external flocculators and clarifiers. Equipment savings can be substantial, up to 85% compared to conventional treatment and 50% compared to direct filtration. The DynaSand Continuous Contact Filtration process is better suited to remove small floc, which can help reduce chemical requirements by 20-30% over conventional treatment.

Applications The DynaSand filter is currently providing exceptional treatment in over 8,000 installations worldwide in a wide variety of applications.



DynaSand Applications – partial list

Tertiary filtration • Algae removal • Potable water (turbidity and color) • Oil removal • Process water • Brine filtration • Metal finishing • Cooling tower blowdown • Steel mill scale • Chemical processing • Phosphorus removal • Product recovery • Denitrification • Cryptosporidium and Giardia removal • Surface water • Ground water • Arsenic removal • Effluent reuse

Typical Data	Loading rate (gpm/ft²)	Influent solids	Filtrate solids
Tertiary Filtration	3-5	20-50 ppm SS	5-10 ppm SS
Potable Water – Turbidity	4-5	10-30 NTU	0.1-0.5 NTU
Potable Water – Color	4-5	10–120 ACU	1-5 ACU
Process Water	5	10-30 NTU	0.1-0.5 NTU
Metal Finishing	4-6	20-50 ppm SS	2-5 ppm SS
Steel Mill Scale	8-10	50-300 ppm SS	5-10 ppm SS
Phosphorus Removal	3-5	<1 ppm Total P	<0.1 ppm Total P
Algae Removal	2-4	100 ppm SS	10-20 ppm SS
Denitrification	3-4	10-15 ppm TN	<3 ppm TN
Oil Removal	2-6	<50 ppm O&G	5-10 ppm O&G

PARKSON CORPORATION

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Quality Management System

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