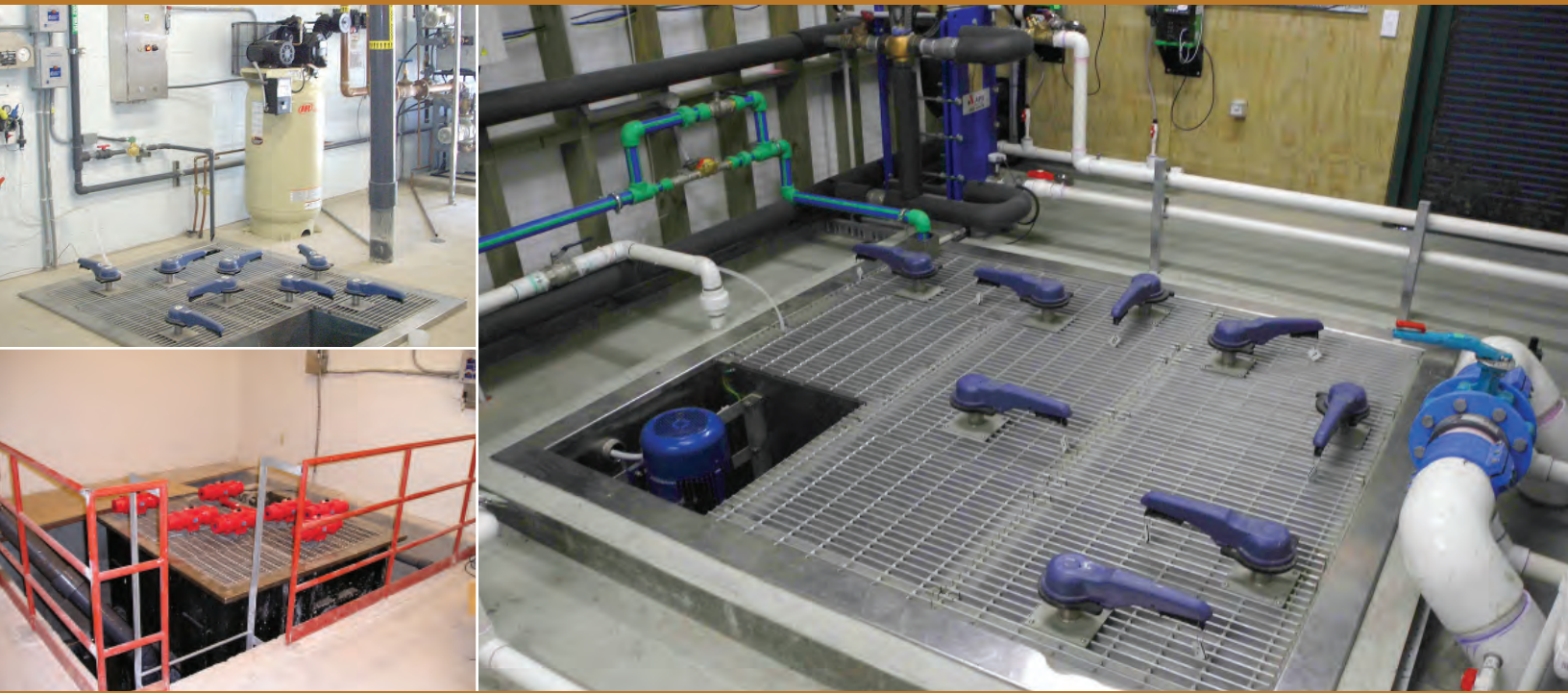




MicroFlo[®] Vacuum Sand Filtration Systems

Information and Technical Data



High-efficiency, large capacity filtration systems for swimming pools, water features and aquatic facilities.

Natare Corporation

Swimming Pools, Aquatic Facilities and Water Features



Natare Corporation is one of the most respected suppliers of equipment, systems and services for commercial and public swimming pools, water features and aquatic recreation in the United States and around the world.

Natare offers a comprehensive selection of equipment and systems, in combination with consulting, engineering and technical services. Whether it's design, construction, renovation or operation, Natare is the key to state-of-the-art aquatic facilities around the globe.

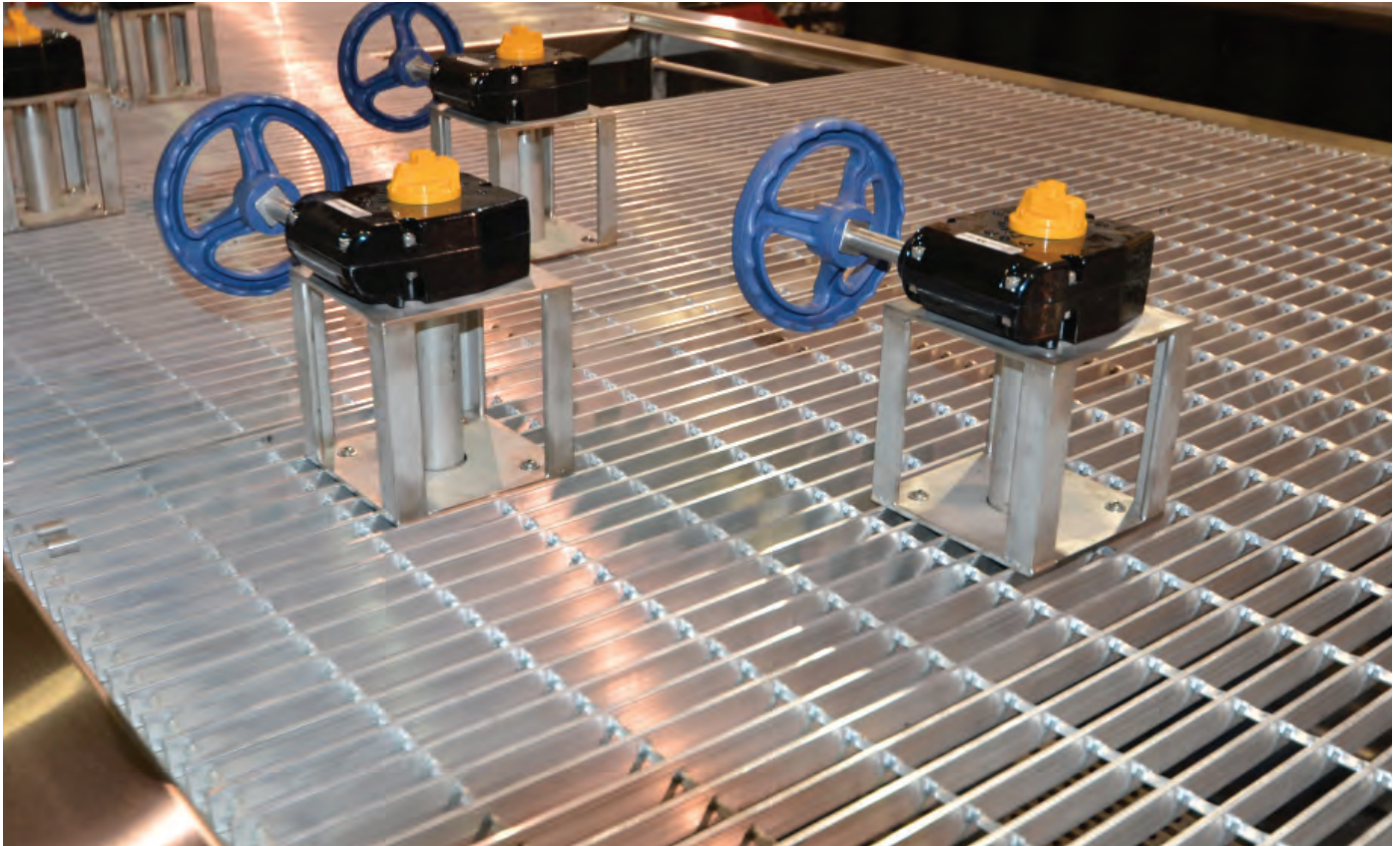
The following information is a collection of topics pertaining to MicroFlo® Vacuum Sand Filtration Systems. These documents include product support information as well as typical specifications and drawings.

We invite all inquiries concerning aquatic or water feature development, planning, construction or renovation. Additional information can be found on-line at www.natare.com or you may contact us at **(800) 336-8828**.

Table of Contents

I.	Introduction to Filtration	3
II.	Why Choose a Natare Vacuum Sand Filter	4, 5
III.	Designing Mechanical Systems	6
IV.	Design, Construction, Features & Benefits	7, 8
V.	Filter and Mechanical Schematics	10, 11
VI.	Typical Details & Design Information	12, 13
VII.	Gen II Filter Control System	14 - 15
VIII.	Chloramine and Vapor Removal System.....	16
IX.	Cryptosporidium Removal	17
X.	Filter Charts and Data	18 - 22
XI.	Filter Specification.....	23 - 26
XII.	Warranty and Warranty Details	27

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MicroFlo® Vacuum Sand Filtration Systems

Low-maintenance, high-efficiency pool filtration and mechanical systems

Natare MicroFlo™ Vacuum Sand Filters Filtration and Mechanical Systems provide high-efficiency, large capacity filtration systems for swimming pools, water features and aquatic facilities.

MicroFlo™ Vacuum Sand Filters offer the most economical, durable and high quality filtration system available. They offer guaranteed water clarity in open- or closed- top filters; are economic and efficient for large facilities; deliver precise control of filter flow rates; and are easy to operate and maintain. The uniquely designed flow-diversion screen and simplified operating controls take the guesswork out of high volume water filtration allowing easy access and a visual check during the filtration process.

All MicroFlo™ Sand Filters are fabricated from low carbon stainless steel with corrosion-proof internal assemblies making them resistant to corrosion and deterioration from harsh pool chemicals and salt water providing long-term filtration solutions.

Natare Corporation's engineering and design resources team-up with our cutting edge manufacturing facilities to provide a custom built MicroFlo™ Sand Filter that meets your exact needs.

MicroFlo™ filters include high efficiency pumps, valves and automatic control systems deliver you with a complete filtration management system.



Why Choose a Natare Vacuum Sand Filter?



Natare MicroFlo® Vacuum Sand Filters offer the most up to date, efficient, economical and cost efficient approach to pool, water feature, fountain or aquatic center filtration, whether new construction or renovation.

Pool construction and operation can be made far better by choosing a Natare MicroFlo vacuum sand filter. Natare MicroFlo filtration systems offer “single source responsibility”. Design and construction coordination issues are eliminated.

- Natare MicroFlo vacuum sand filters are complete systems that eliminate the issues with “site-designed and site-built” mechanical systems. The entire filtration plant is designed and manufactured under controlled plant conditions and is shipped to the project site as a complete unit. MicroFlo vacuum sand filters are complete with all required pumps, valves, controls and media, all certified to produce excellent water quality and economical operation. These pre-engineered systems can **reduce construction time by over 80%**.
- Natare MicroFlo vacuum sand filters will **reduce water consumption by as much as 80%** through carefully designed hydraulics and “air boost” backwash. This means that thousands of cubic meters of water are no longer lost during each backwash. The cost to purchase, treat, and filter makeup water is substantially reduced or totally eliminated.
- MicroFlo vacuum filters **reduce electrical energy costs and eliminate the wasted electrical energy** for high pressure filtration systems. Low operating pressures save electricity.
- MicroFlo Vacuum Sand filters incorporate a unique *pulse-collapse* air-assisted backwash system that thoroughly cleans the filter media while oxidizing the organic and microbiological debris that cause “filter slime” in virtually all typical pool filters. **No biofilm, no media replacement, and no filter cleaning chemicals are required.**
- Natare MicroFlo filters are constructed from heavy-gauge stainless steel, the toughest, most durable material available for pool construction. Since stainless steel is 100% recyclable, and most stainless steel is produced from scrap metal, **Natare filters are “Green”** and can qualify for LEED credit. Fifteen (15) year warranties are offered with MicroFlo filters. Compare the performance, durability and warranty of a MicroFlo filter to typical fiberglass pressure sand filters. A Natare MicroFlo filter will still be under warranty and performing perfectly long after the fiberglass or steel filter has been replaced.
- Natare MicroFlo vacuum sand filters **substantially reduce maintenance costs** by providing complete backwash and cleaning of the filters as compared to the partial cleaning that occurs with typical pressure sand filters. The filter cycle of a Natare MicroFlo is a minimum of 30-days rather than the 3-5 day filter cycles of a typical sand filter. The entire backwash process is visual; the operator can see exactly what is happening throughout entire filtration cycle.



Perfectly clear pool water and lower costs!

- Natare MicroFlo Vacuum Sand filters allow **increased turnover and higher filtration rates** with minimal increase in system costs. Purchase far more filter for far less expense cost.
- MicroFlo vacuum sand filtration **can remove 98% of cryptosporidium size particles** (4 to 5- μ m). Cryptosporidium is a protozoan parasite resulting from fecal matter in pools that causes a range of health programs, including diarrhea, nausea, vomiting, abdominal cramps, and more serious illness in immunocompromised persons.
- MicroFlo filtration systems can **totally eliminate the need for separate surge or balance tanks**. Surge tanks and balance tanks are difficult to construct, hard to balance and prone to deterioration and leakage. Auxiliary surge management and surge control systems can handle any aquatic environment.
- Natare MicroFlo vacuum sand filters **eliminate the need for separate hair and lint strainers**, which are required for typical pressure filter systems. The elimination of hair and lint strainers can save over one hour of staff time per day by not having to clean strainers or shut down the system for daily maintenance. Hair and lint strainers are the single most troublesome component in most filtration system and often lead to premature pump failure.
- Natare MicroFlo vacuum sand filters remove **particles one half (1/2) the size of particles removed by typical pressure filters**. This means cleaner, clearer and more satisfactory water quality. MicroFlo vacuum sand filters **do not require coagulants, flocculants or other expensive filter aids** to produce excellent water quality.
- MicroFlo vacuum sand filters actually **remove volatile organic compounds and entrained gases from pool water**, including the precursors to chloramines and the combined chlorines that cause eye irritation and poor sanitation. Better water, far less eye and lung irritation, and the pool and pool environment simply sells better!
- MicroFlo vacuum sand filters offer **automatic, failsafe operation**. Whether the standard semi-automatic system or a fully automatic auto-backwash system, Natare MicroFlo filters work better. Integrated controls, sold state touch screen operation, automatic shut-down, integration with building automatic systems, remote operation. VFD-ready electrical systems and water level controls are standard.
- A Natare MicroFlo vacuum sand mechanical system featuring a MicroFlo vacuum sand filter can **reduce building space or mechanical room footprint by over 75%** when compared to typical pressure filters and pressure filtration mechanical plants. The savings that can occur from using a Natare mechanical plant rather than a typical pressure system can and often will exceed the total cost of the mechanical system. Outdoor installation is possible in virtual any environment.
- Natare pools and filtration systems offer **“single source responsibility”**. Design and construction coordination issues are eliminated, and the “finger-pointing” that is typical in most pool construction projects simply does not happen with a MicroFlo filter.





Designing Mechanical Systems



Designing mechanical systems for swimming pools or aquatic facilities is easy—just connect a filter, pump and heater together, tie in some chlorination and pH control equipment, and then add valves and electrical switchgear. The hard part is selecting the proper components and determining their precise relationship to the other equipment in the system. Often an organized evaluation of the mechanical design is undertaken only when someone attempts to discover why the pool cannot be built as designed or is not operating properly.

When properly structured, the design of a mechanical system for a swimming pool facility begins with the schematic design. This process starts with data-gathering and research. Information concerning site conditions, physical requirements, and the owner's preferences are recorded in an organized checklist to establish the basis for future design decisions.

This checklist guides the equipment selection and can help recognize potential conflicts of the pool design. For example, a high-rate sand filter could not be efficiently utilized in areas where it would be difficult to dispose of backwash water, nor could gas chlorine be used in a state where the public pool code specifically forbids its use.

Such statements seem obvious, yet these and similar errors are quite common. Even the most experienced pool designer can inadvertently overlook a critical condition that can drastically change or influence pool design. An organized review of design requirements can help prevent oversights.

The next step in the design process is to develop a block or schematic layout. This graphically places each component in the system and illustrates its relationship to others. Actual equipment locations or pipe layouts are not important. The goal is to identify the necessary equipment and to define how it interacts as a whole.

Next, collect data on pipe size, pump elevation, dimensions, etc., and record it on this diagram to provide the basis for system hydraulic calculations and equipment location. At this preliminary stage, it is easy to make corrections, and the designer may work through numerous system designs before deciding on a final layout. Once the components of the mechanical system are determined, the equipment locations can be addressed and filled-in with space requirements, pipe routing, pipe size, valves, etc.

When the schematic design is complete, it's extremely important that everyone involved with the project considers and understands the specific components, products and systems to be used. If everyone is in agreement, the final design development can proceed. Depending upon the skill of the installer and the complexity of the project, numerous drawings may evolve from the schematic design. On paper, this sounds easy. In reality, it's a complex process involving numerous decisions and compromise.



Design, Construction, Features & Benefits

MicroFlo™ Vacuum Sand Filter Features

- **Easy operation**
- **Safe open filter tanks**
- **Highly economical and efficient stainless**
- **Precise control of filter flow rates**
- **Easy maintenance**
- **Guaranteed water clarity**
- **Optimal results with minimal water consumption**
- **Extensively tested and approved by the NSF International for flow rates up to 20 gpm/sq ft**

A Vast Improvement in Filtration

Our MicroFlo™ Vacuum Sand Filters System consists of an open grating stainless steel filter tank available in a “compact” configuration. The filter contains our specially designed filter laterals attached to a stainless steel collection manifold.

The entire filter is impervious to most corrosive pool chemicals and environmental conditions. The open tank construction, the uniquely designed flow-diversion screen and simplified operating controls take the guesswork out of water filtration by allowing easy access and a visual check during the entire filter process.

Custom Designed with Your Needs in Mind MicroFlo™ Vacuum Sand Filters can be provided with optional ladders, filter tank covers, access hatches, control panels, or other accessories to provide a completely pre-assembled, pre-piped filter tank which can be economically installed in the pool deck, mechanical room or surrounding area.

All MicroFlo™ Vacuum Sand Filters are custom engineered and tailored to the requirements of each project. Rugged, efficient, low maintenance units are all constructed with durability and performance in mind.

These factory assembled filter units come complete with flanges and pipe connections for field installation. The stainless steel filter tank are matched to the highly efficient straight centrifugal recirculating pump selected for the hydraulic requirements of each system. Valves and auxiliary equipment can be provided for subsequent on-site hookup to the filter.





Design, Construction, Features & Benefits

Design Data

Typical Use and Operation:

- MicroFlo® vacuum sand filters are intended for use in swimming pool, spa, water feature or process water filtration where high water quality and clarity is required in conjunction with low operating costs and minimal maintenance. Typically provided as an open-top rectangular tank, the entire filtration compartment is covered with a reinforced safety grating. The filter also serves as a balancing tank and backwash dispersion reservoir.

Sizes:

- Standard sizes from 24 ft² to 152 ft², (2.23 m² to 14.12 m²) suitable for flow rates from 240-gpm (54.5 m³/hr) to 3040-gpm (690 m³/hr) per filter. Custom sizes also available.

Flow rates:

- 10 to 20 gpm per sq ft of filter area. (24.5 to 48.9 m³/hr per sq m of filter area) NSF listed for flow rates to 20 gpm (24.5 m³/hr)

Materials of Construction:

- Filter construction is carbon controlled 316 steel standard; 316L, 317LMN, 2205 Duplex, 6%-MO optional.
- NSF listed Schedule 80 internal piping
- Non-corrosive PVC Valves
- Aluminum walkway gratings
- Polyester reinforced laterals

Pumps:

- High efficiency integral vertically mounted end-suction centrifugal pump operating in flooded suction mode are provided with the filter.

Control Systems:

- Electrical controls for automatic air release and vacuum limit. Optional: Automatic and semi-automatic filter operation, power actuated backwash positioning. Automatic flow control and turbidity monitoring. Variable volume, filter flow.

Suitability:

- Gen II advanced filtration controls
- Suitable for buried or free standing installation.
- Suitable for freshwater or saltwater (316L or better construction only)
- Suitable for indoor or outdoor installation, with or without covers.

Options:

- Air-assisted backwash
- Variable volume filtration
- Polymer cover for pump and controls (exterior use)
- Cryptosporidium removal system
- Hydraulic backwash or power assisted.

Electrical Requirements:

- As determined by pump and flow requirements. Typically available in 208/230/380/460/580 volt 3 Phase, 60/60 Hz. Control systems require single 20 amp dedicated circuit.

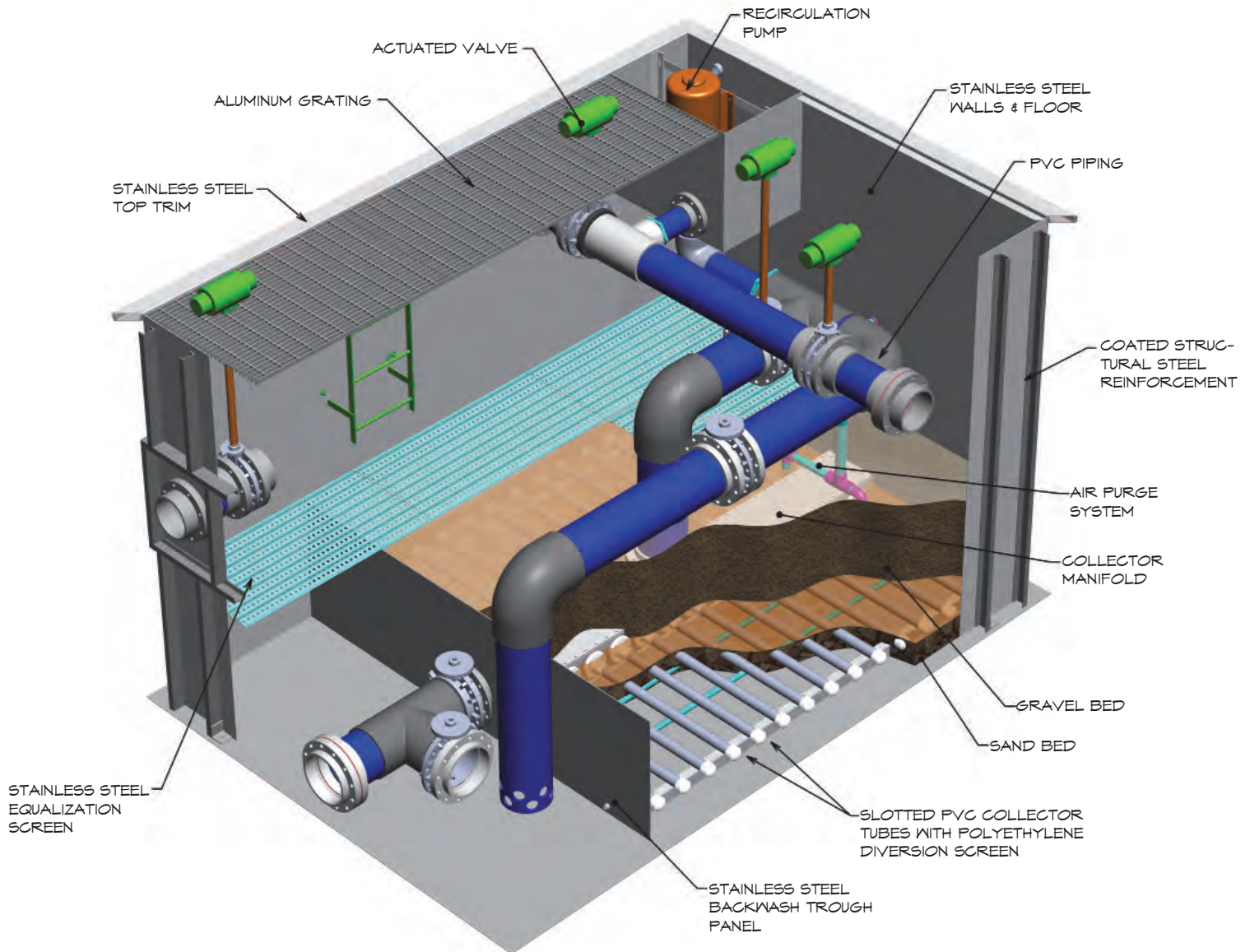
Media Requirements:

- For swimming pool use, standard .45-.55 silica sand per NSF Standard 50. Alternate media as required for other applications.



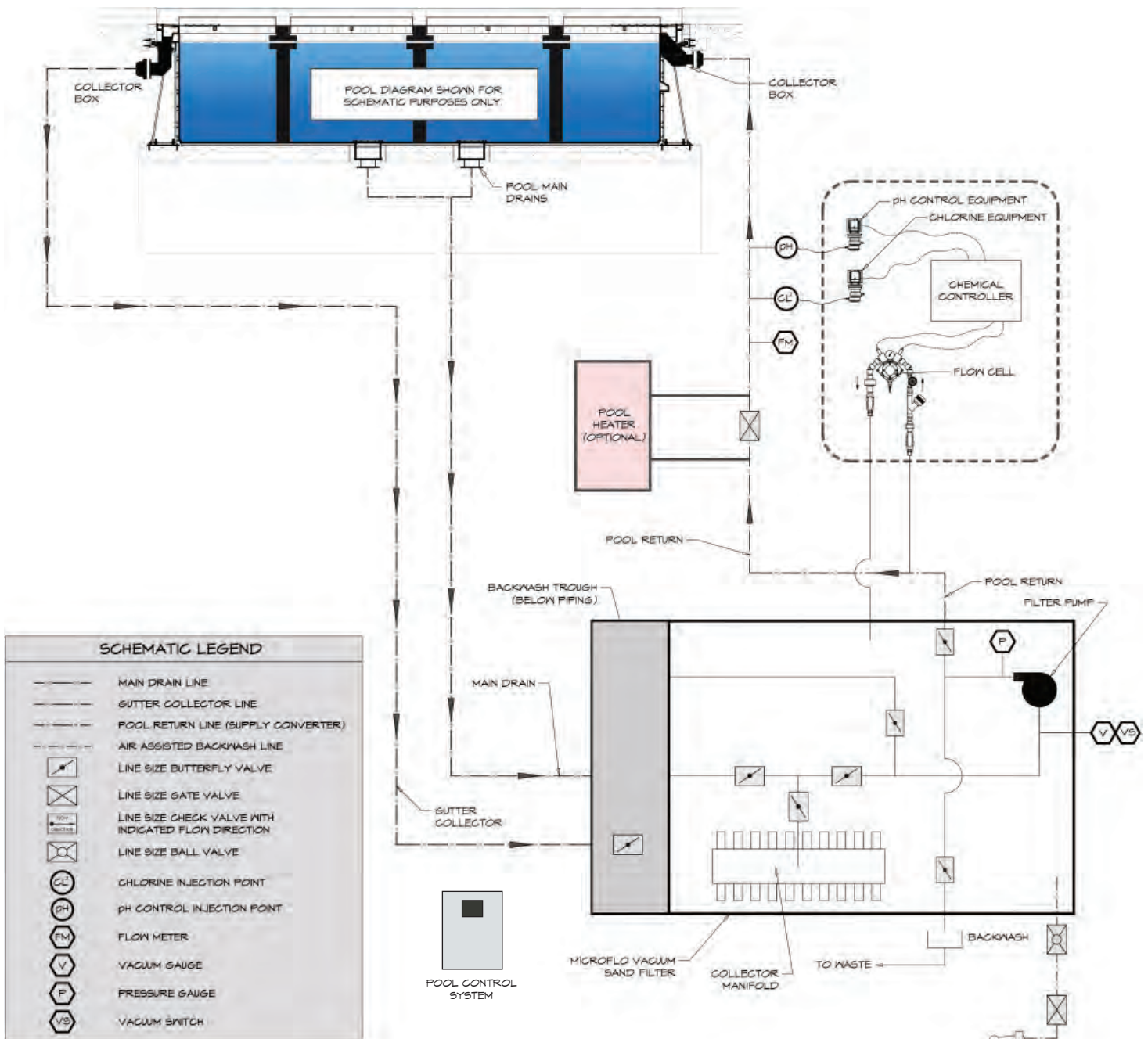
MicroFlo Vacuum Sand Filter Benefits:

- Reduces water consumption by up to 80%
- Ideal water clarity.
- Complete circulation, filtration, and treatment systems. Integral heat exchangers are also available.
- Heavy-gauge pre-engineered stainless steel construction, eliminates site construction variations or design changes.
- Reduces electrical consumption by up to 75%
- NO hair and lint strainers to clean. Daily maintenance is eliminated.
- Eliminate the need for separate surge or balance tanks. Ideal for renovation or new construction.
- Cryptosporidium removal



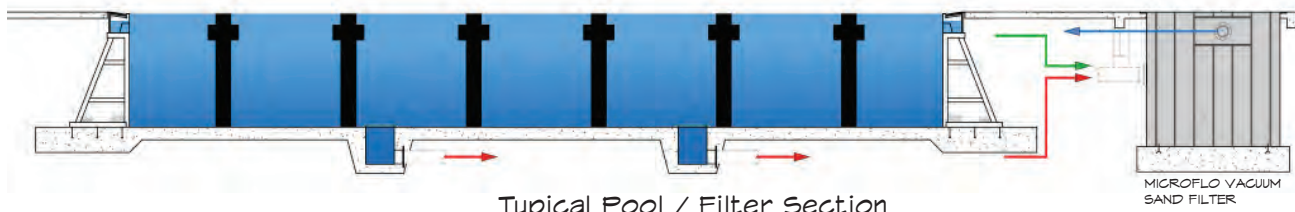


Mechanical System Schematic no scale



Typical Pool / Filter Schematic

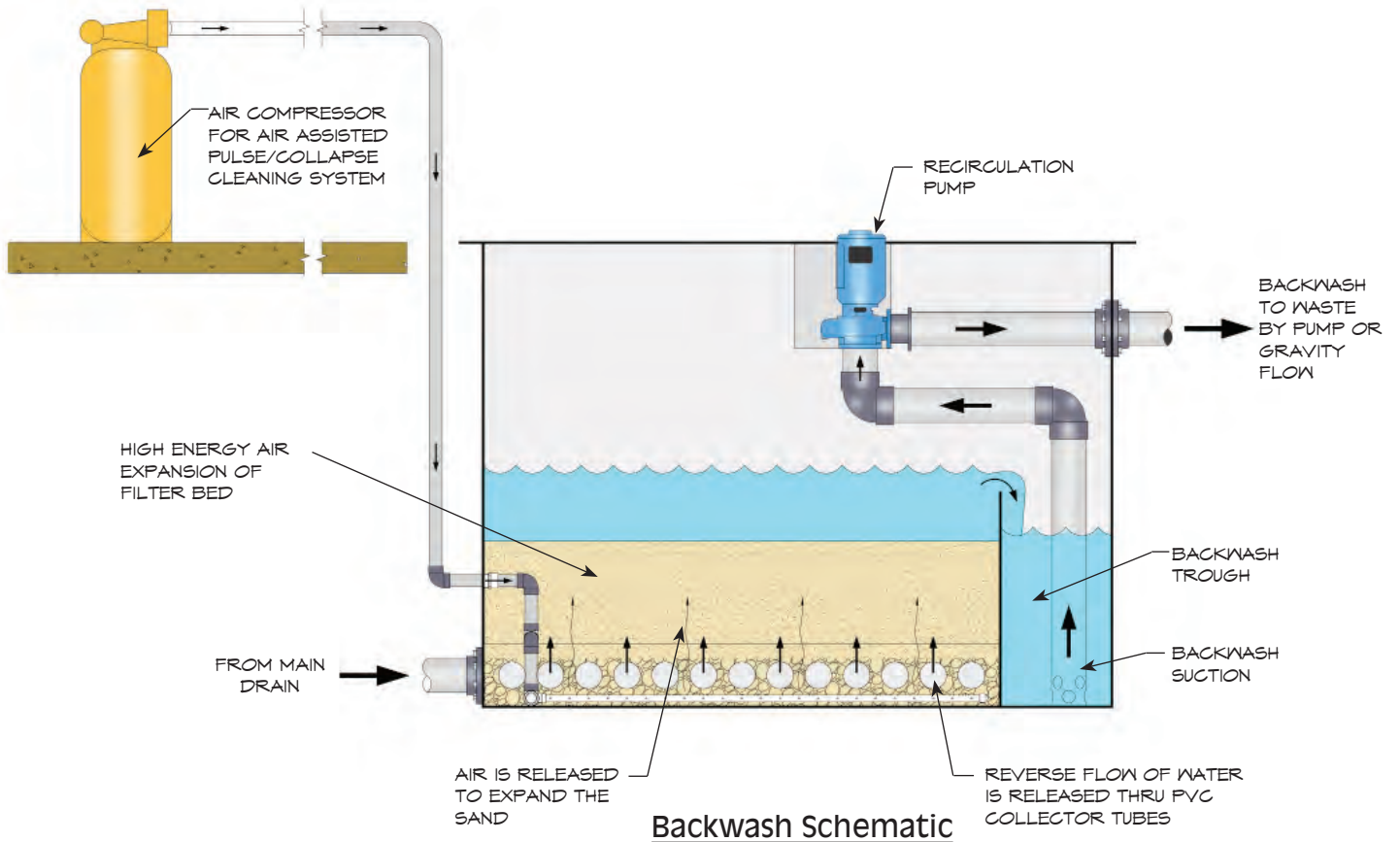
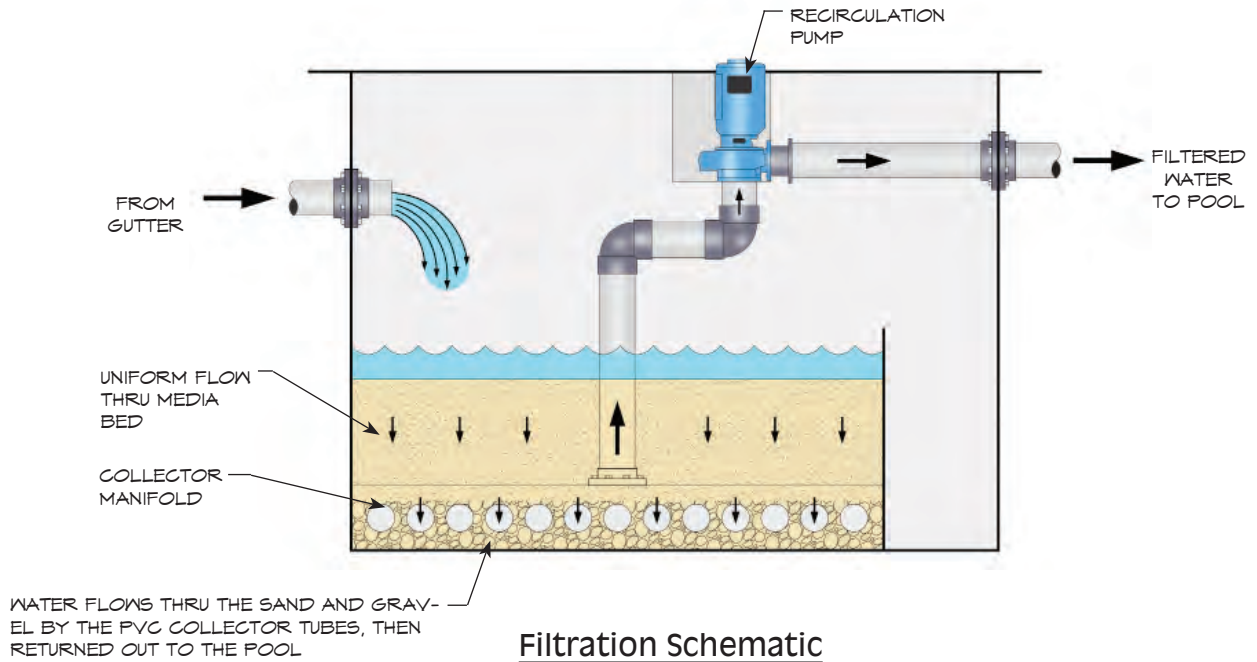
AIR ASSISTED BACKWASH SYSTEM



Typical Pool / Filter Section

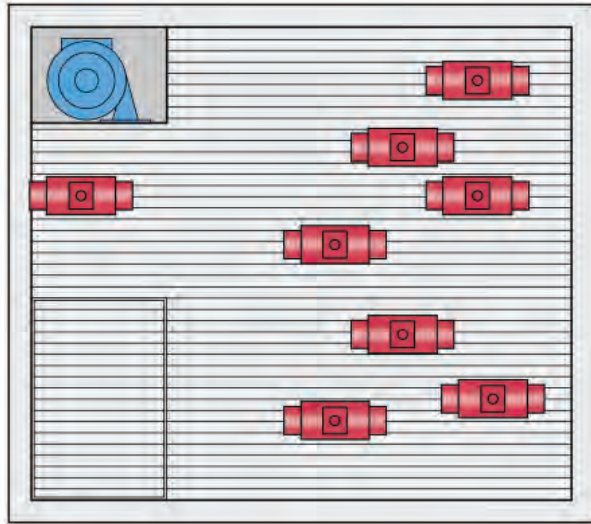


Vacuum Sand Backwash and Filtration Schematics





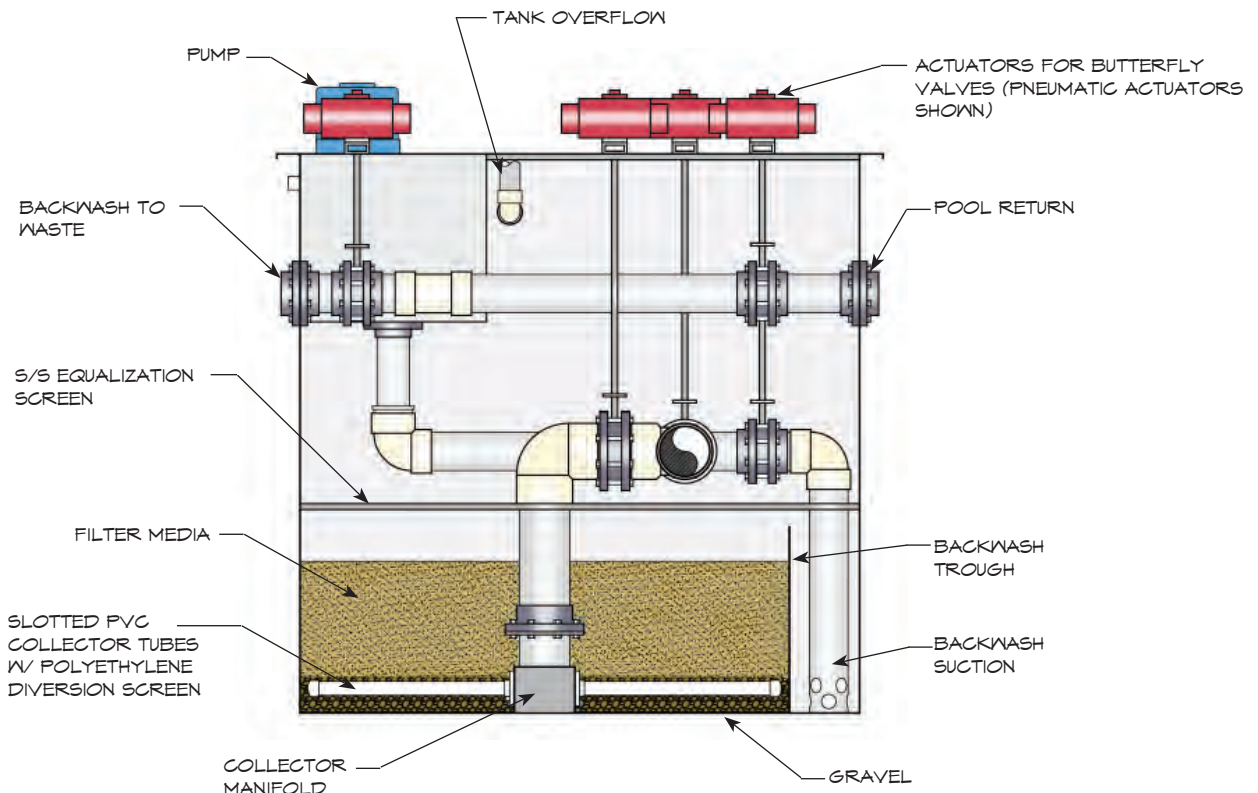
Typical MicroFlo Vacuum Sand Filter Details



Plan View



Filter Isometric View

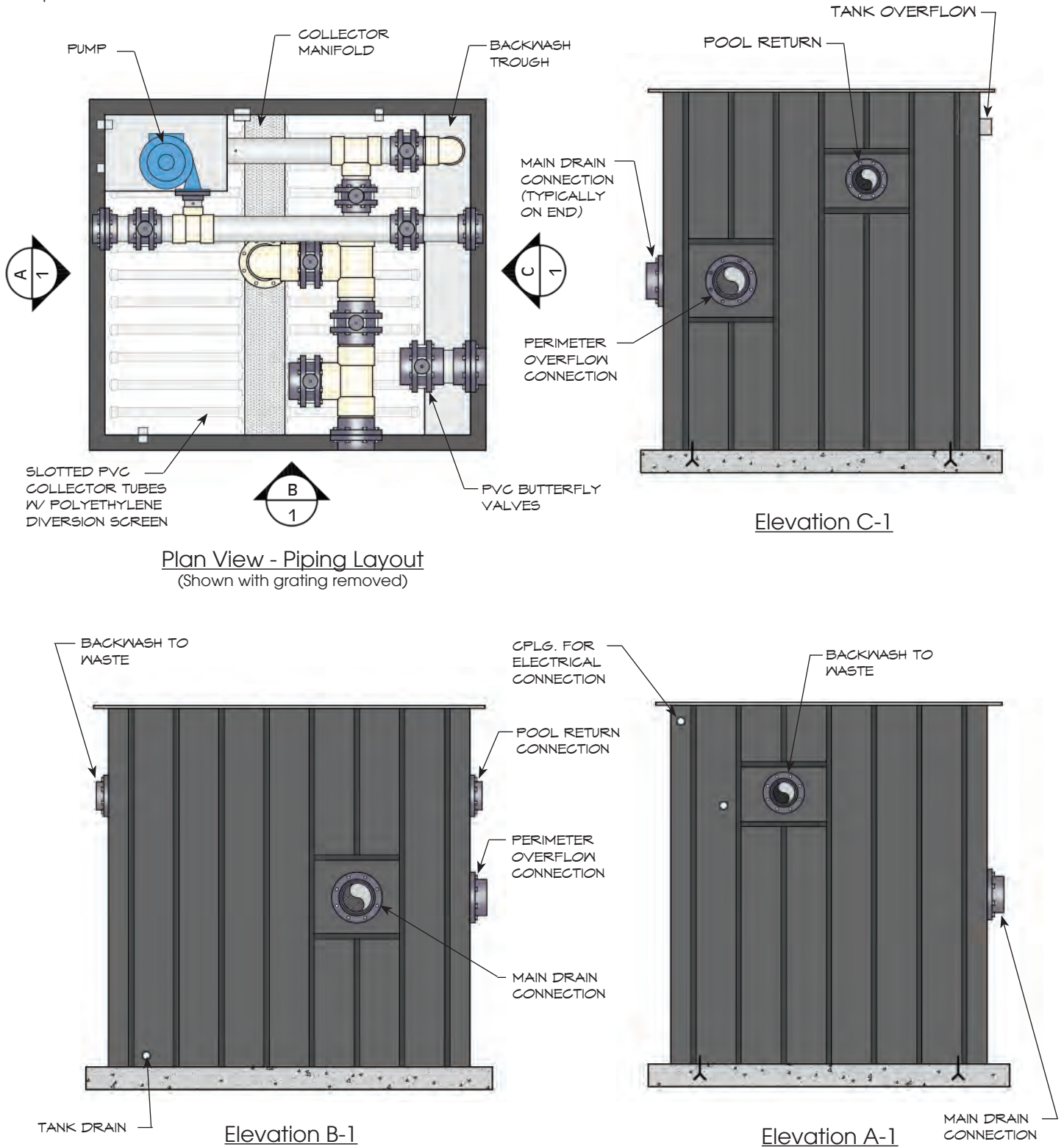


Filter Section View



Typical Details and Design Information

*Representative locations of all connections.





(Optional) Natare MicroFlo vacuum sand Gen II filter control system

Natare MicroFlo® Vacuum Sand Filters offer the most up to date, efficient, economical and cost efficient approach to pool, water feature, fountain or aquatic center filtration, whether new construction or renovation. Pool system operation is far easier, more foolproof, and safer by choosing a Natare MicroFlo vacuum sand filter. Three different control system options provide pinpoint operation of the pool circulation and filtration system while reducing the complexity of daily pool maintenance.

With MicroFlo filtration, “Purpose-built” controls are matched to the unique requirements of each project to offer “single source responsibility” and eliminate design coordination issues.



Standard MicroFlo Controls – the basic controls for a MicroFlo vacuum sand filter that provide the necessary levels of monitoring and control for filter operation.

- System Information Panel with filter information, basic operating instructions, pressure and vacuum liquid-filled gauges.
- Manual, automatic or system off selector and motor starter interlock
- Automatic shutdown if backwash is required or high vacuum occurs from line blockage or system malfunction.
- Automatic filter air release sparging nightly at selectable time.
- Interlock capability for BMS, heater, and/or motor starter.

Enhanced MicroFlo Controls – enhanced controls for a MicroFlo vacuum sand filter that provide additional levels of monitoring and control for filter operation including actuation and control of pneumatic valves.

- System Information Panel with filter information, basic operating instructions, pressure and vacuum liquid-filled gauges.
- Manual, automatic or system off selector and motor starter interface
- Automatic shutdown if backwash is required or high vacuum occurs from line blockage or system malfunction.
- Automatic filter air release sparging nightly at selectable time.
- Interlock capability for BMS, heater, and/or motor starter.
- Automatic control, positioning and actuation of pneumatic valves (eliminates manual valve changes or positioning).

Note: pneumatic valves are included as an option in the filter

GEN II Controls - The GEN II is our newest, most comprehensive and complete control systems for a filtration system. These unique systems set a new performance standard for accurate up to the second monitoring and precise automatic control over all aspects of the pool mechanical, filtration, and circulation system operation.

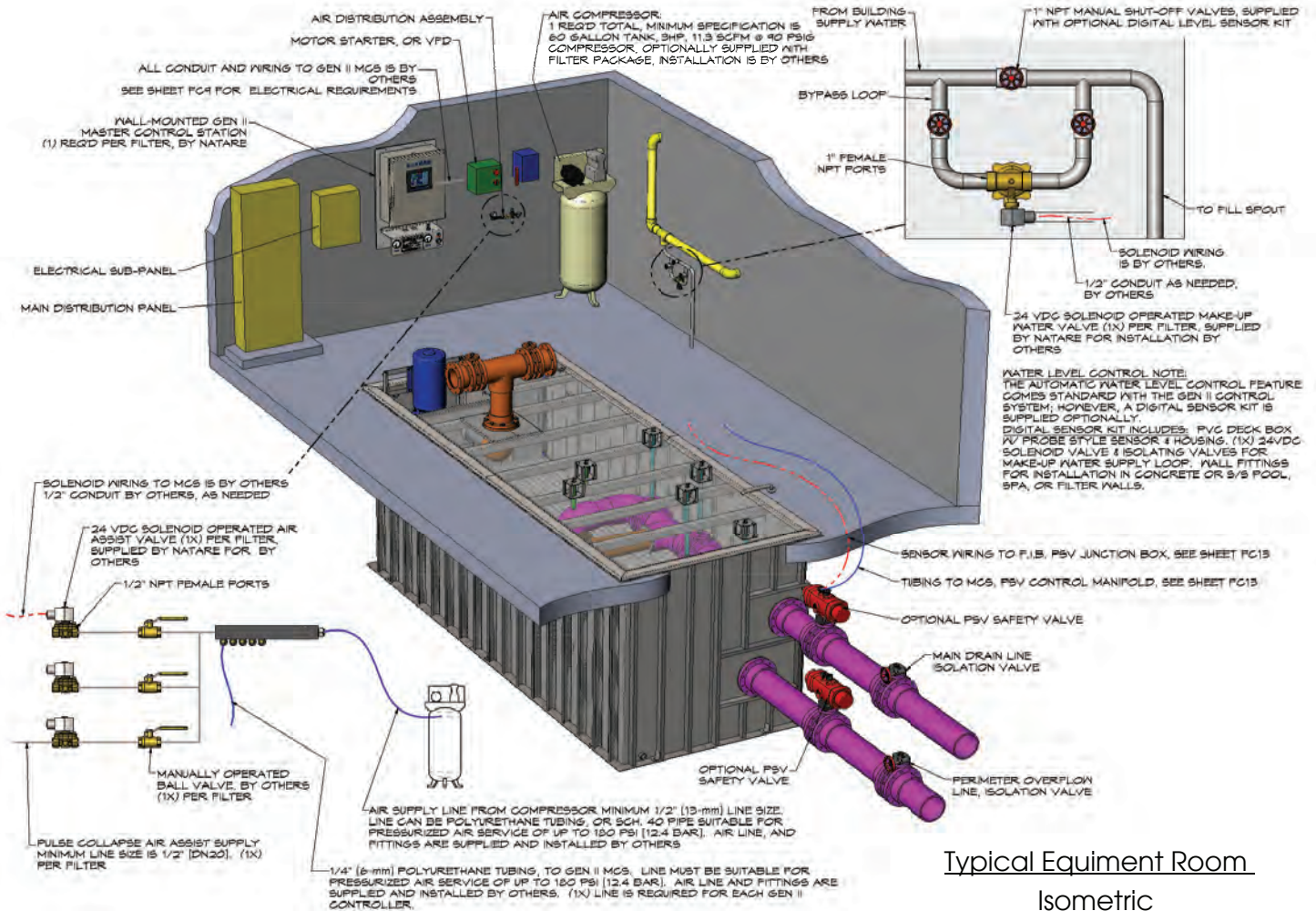
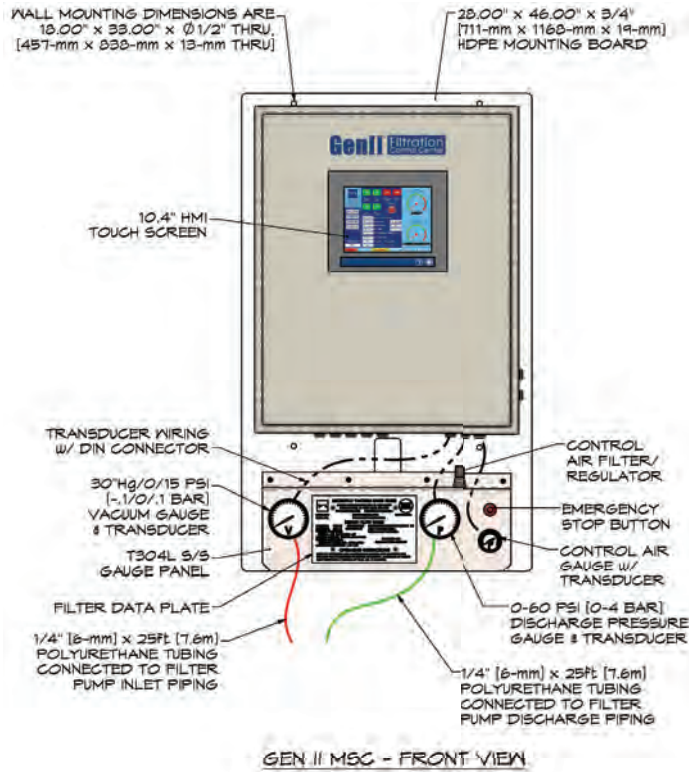
Designed with the features and capabilities most requested for the successful operation of large, high volume pools, GEN II Controls from Natare provide information and monitoring to ensure safe, economical and trouble-free pool or water feature operation. Unique features include visual indication of all filtration and circulation functions as well as communication with BMS systems, remote monitoring, and integration with all common water quality control systems. One GEN II control is required for each filter, but the GEN II Controls are “aware” of the entire system and can respond to events in adjoining or other filters. Automatic and powered valve actuation is available for even the largest systems.

GEN II controls provide the complete package with touch-screen LED control tailored to the unique requirements of each installation. Analog and digital panels display all-important operational aspects of successful pool management and including automatic filter operation. The LED panel also provides for selectable unit of measure (Imperial or Metric) for the various displays. Water level control, flow monitoring and control, level and temperature sensors, even the control of the pneumatically operated valves. MicroFlo Filtration and GEN II Controls are clearly the next generation of pool operation and water quality.



MicroFlo® Vacuum Sand Filtration Systems

Natare Corporation



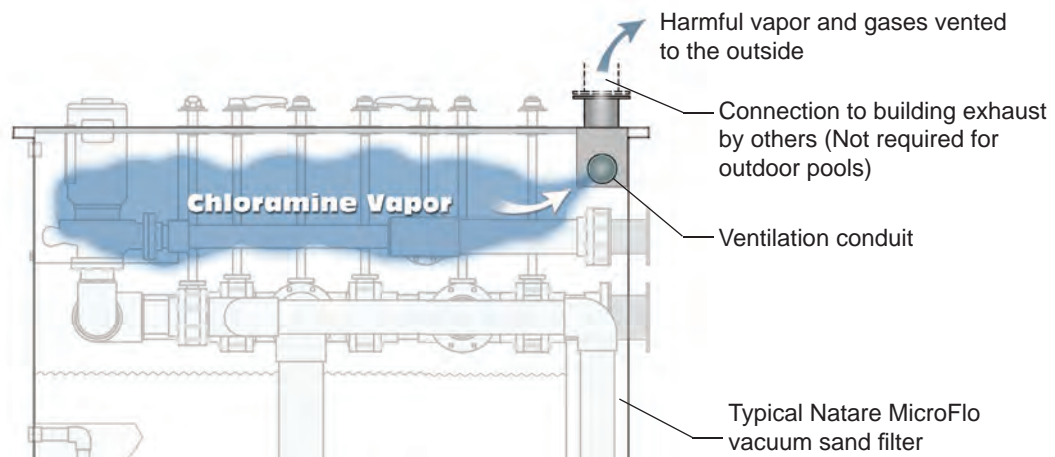


(Optional) Natare chloramine extraction and vapor removal system

Most people do not realize that the chlorine smell that is experienced in most indoor pool facilities is potentially harmful to their health. Pool operators know all too well that this smelly vapor accelerates the deterioration of the pool facility and equipment. The smell is a form of combined chlorine call a “chloramine”, which causes obnoxious odors as well as skin, eye, and respiratory irritation that many people mistakenly believe to be too much chlorine itself. Outdoor pools have plenty of fresh air and sunshine (ultraviolet light) so chloramine odor and vapor problems are minimized.

Many indoor pools, even with those excellent water chemistry, often suffer from persistent “chloramine odor”. When chloramine levels in pool become excessive (0.3-0.5 parts per million (ppm) or greater), people begin to complain. Now there is a way to fight this serious problem by utilizing Natare’s MicroFlo® vacuum sand filters and their unique vapor removal system to extract these gases and vent them outdoors rather than allowing them to accumulate in the pool area.

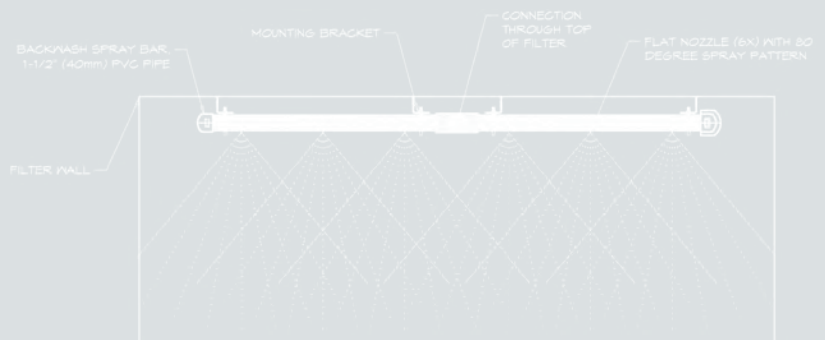
Natare’s optional extraction and vapor removal system is located inside the MicroFlo vacuum sand filter. This system takes advantage of the natural operation of MicroFlo vacuum filtration to safely strip large amounts of vapor and gases and vent them to the outdoors rather than accumulating in the pool area. This in turn greatly reduces the harmful foul smelling odor giving your pool facility a safer, less destructive, and more pleasant environment.



Typical MicroFlo Vacuum Sand Filter Section

Natare Vacuum Sand Filter Spray Bar (Standard on all MicroFlo vacuum sand filters)

The Spray Bar is mounted inside our MicroFlo vacuum sand filter. During the backwash cycle, the spray bar is activated to quickly force floating debris and sediment into the backwash trough. Which increases the efficiency and saves even more water during the backwash cycle.



Top View Showing Spray Pattern



Cryptosporidium Removal with MicroFlo vacuum sand filtration

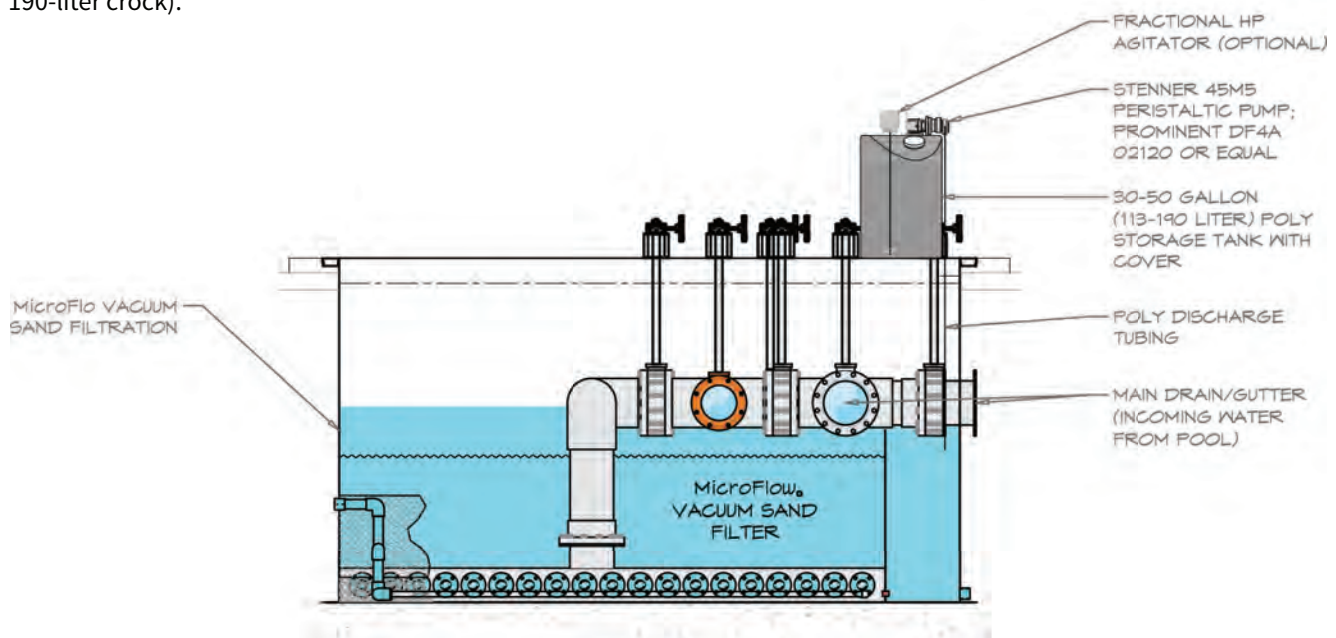
MicroFlo® vacuum sand filtration is the most efficient and effective filtration system for any swimming pool, water feature or aquatic environment. In fact, the larger the volume of water to be filtered or the higher the turnover rate, the more cost effective MicroFlo filtration can be. This rugged, industrial grade system utilizes a unique proprietary design to remove extremely small particles to produce unmatched water clarity and quality.

A MicroFlo vacuum sand filter works with specially graded silica quartz sand, properly graded and sized Perlite, or appropriate grades of Zeolite. The recommended media is silica quartz sand in the appropriate size and grain distribution, and we do not take a position on the benefits or economics of Perlite or Zeolite as a filter media, nor do we recommend using either material in lieu of quartz sand.

If cryptosporidium is a concern or removal is a requirement, we recommend the addition of fine coating of Perlite as a filter aid as it has a demonstrated ability to remove cryptosporidium. Cryptosporidium is a chlorine-resistant protozoan pathogen that causes the majority of waterborne disease outbreaks in swimming pools. A very thin layer of perlite on the top of the media bed has demonstrated removal of Cryptosporidium-sized particles (oocysts).

For the cryptosporidium removal with Natare MicroFlo vacuum sand filters, a slurry metering pump with a fractional horsepower mixer and solution crock is provided to feed a solution of Perlite. Perlite is not soluble in water thus it is prepared as a slurry. The typical feeding equipment is a 50-gallon (189.27-liter) UV stabilized PE (Polyethylene) storage tank with a top cover, metering pump and fractional horsepower agitator that is installed on top of the MicroFlo vacuum sand filter grating or in a remote location. The poly crock, metering pump and agitator are the same size, regardless of the filter size, but the metering pump is capable of being adjusted to match the dosage rate required by various filter sizes.

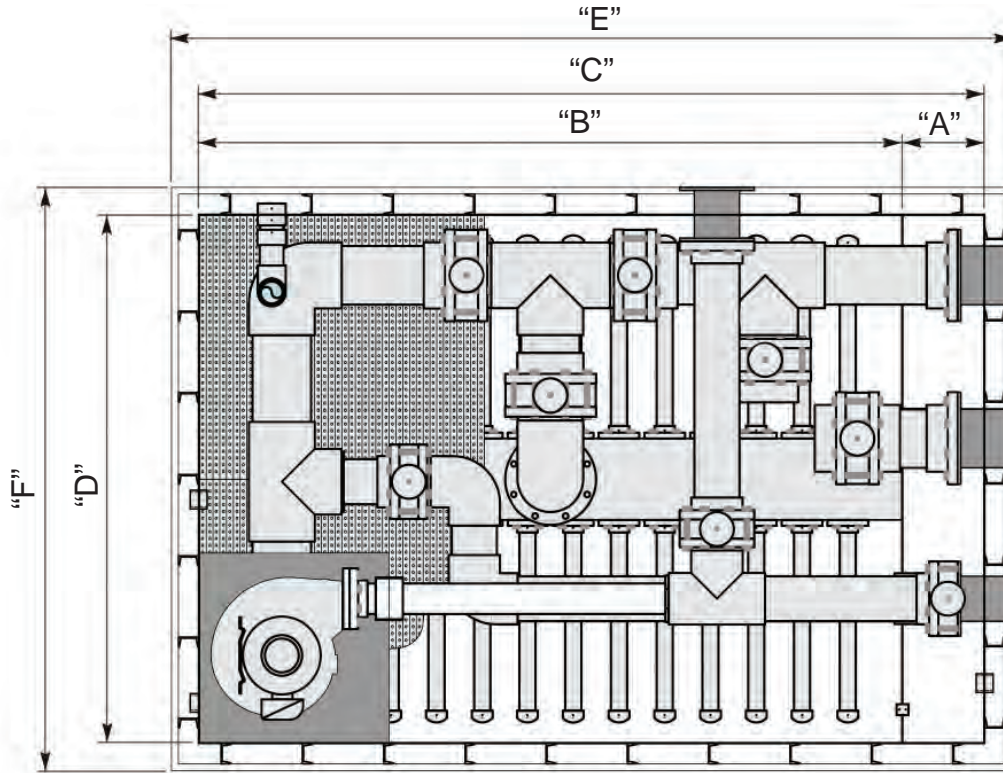
The initial process charge is added after air purging and is based upon filter size, which consists of approximately (1.2-kg/m² or .25-lb/ft²). That charge is added manually, while the remainder of the feed is done automatically as a trickle body feed of about .12 to .24-kg/day/m² (.20-lb/day/ft²). Since the density of Perlite varies with different manufacturers, it is important to obtain a “filtration grade” of Perlite, preferable certified for swimming pool use by NSF or other certifying bodies. The initial concentration of perlite slurry using water is about 120 g/l (0.008345 lb./gal.) or roughly .5-lb in a 50-gallon crock (.23-kg in a 190-liter crock).



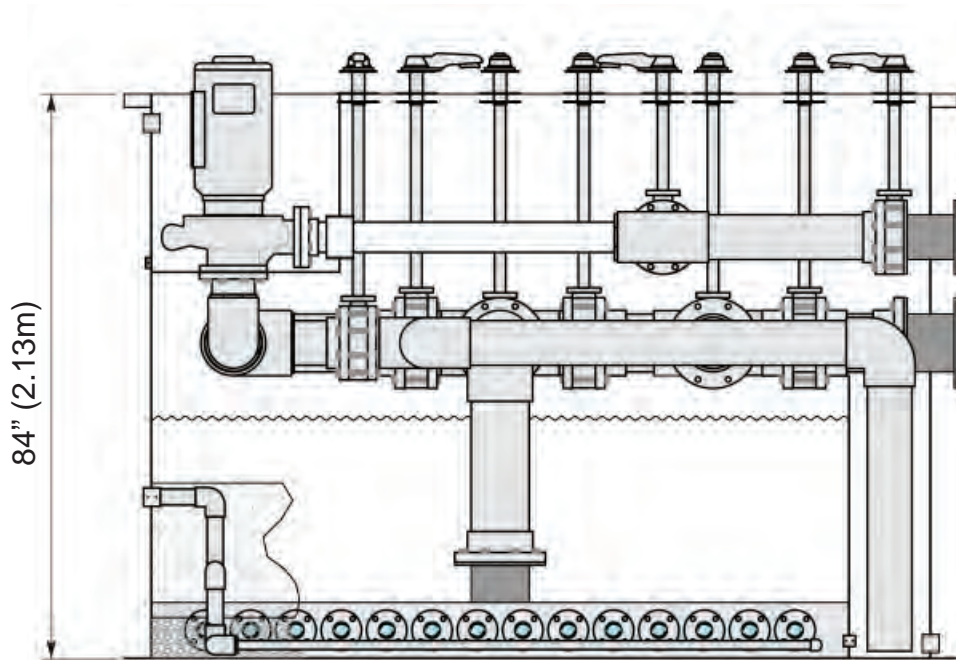
Typical MicroFlo Vacuum Sand Filter Section



MicroFlo Vacuum Sand Filter Dimensional Data (Typical)



Typical Filter Plan View



Typical Filter Section View



MicroFlo Vacuum Sand Filter Dimensional Data

STANDARD FILTER HEIGHT **84.0 in (2.134 m)**

STANDARD FILTER WIDTH **78.0 in (1.981 m)**

VSF DIMENSIONAL DATA - <i>IMPERIAL VALUES</i>								
MODEL NUMBER	NOMINAL FILTRATION AREA	FILTER AREA LENGTH ("B")	BALANCE TROUGH WIDTH ("A")	FILTER LENGTH ("C")	FILTER WIDTH ("D")	EFFECTIVE FILTRATION AREA	OVERALL OUTSIDE LENGTH ("E")	OVERALL OUTSIDE WIDTH ("F")
22900.24	24 ft ²	45.0 in	18.0 in	63.0 in	78.0 in	24.4 ft ²	71.0 in	86.0 in
22900.30	30 ft ²	56.0 in	18.0 in	74.0 in	78.0 in	30.3 ft ²	82.0 in	86.0 in
22900.36	36 ft ²	67.0 in	18.0 in	85.0 in	78.0 in	36.3 ft ²	93.0 in	86.0 in
22900.42	42 ft ²	78.0 in	18.0 in	96.0 in	78.0 in	42.3 ft ²	104.0 in	86.0 in
22900.48	48 ft ²	89.0 in	18.0 in	107.0 in	78.0 in	48.2 ft ²	115.0 in	86.0 in
22900.56	56 ft ²	104.0 in	18.0 in	122.0 in	78.0 in	56.3 ft ²	130.0 in	86.0 in
22900.64	64 ft ²	119.0 in	18.0 in	137.0 in	78.0 in	64.5 ft ²	145.0 in	86.0 in
22900.72	72 ft ²	133.0 in	18.0 in	151.0 in	78.0 in	72.0 ft ²	159.0 in	86.0 in
22900.80	80 ft ²	148.0 in	24.0 in	172.0 in	78.0 in	80.2 ft ²	180.0 in	86.0 in
22900.88	88 ft ²	163.0 in	24.0 in	187.0 in	78.0 in	88.3 ft ²	195.0 in	86.0 in
22900.96	96 ft ²	178.0 in	24.0 in	202.0 in	78.0 in	96.4 ft ²	210.0 in	86.0 in
22900.104	104 ft ²	192.0 in	24.0 in	216.0 in	78.0 in	104.0 ft ²	224.0 in	86.0 in
22900.112	112 ft ²	207.0 in	24.0 in	231.0 in	78.0 in	112.1 ft ²	239.0 in	86.0 in
22900.120	120 ft ²	222.0 in	24.0 in	246.0 in	78.0 in	120.3 ft ²	254.0 in	86.0 in
22900.128	128 ft ²	237.0 in	24.0 in	261.0 in	78.0 in	128.4 ft ²	269.0 in	86.0 in
22900.136	136 ft ²	252.0 in	24.0 in	276.0 in	78.0 in	136.5 ft ²	284.0 in	86.0 in
22900.144	144 ft ²	266.0 in	24.0 in	290.0 in	78.0 in	144.1 ft ²	298.0 in	86.0 in
22900.152	152 ft ²	281.0 in	24.0 in	305.0 in	78.0 in	152.2 ft ²	313.0 in	86.0 in

VSF DIMENSIONAL DATA - <i>METRIC VALUES</i>								
MODEL NUMBER	NOMINAL FILTRATION AREA	FILTER AREA LENGTH ("B")	BALANCE TROUGH WIDTH ("A")	FILTER LENGTH ("C")	FILTER WIDTH ("D")	EFFECTIVE FILTRATION AREA	OVERALL OUTSIDE LENGTH ("E")	OVERALL OUTSIDE WIDTH ("F")
22900.24	2.23 m ²	1.143 m	0.457 m	1.600 m	1.981 m	2.26 m ²	1.803 m	2.184 m
22900.30	2.79 m ²	1.422 m	0.457 m	1.880 m	1.981 m	2.82 m ²	2.083 m	2.184 m
22900.36	3.34 m ²	1.702 m	0.457 m	2.159 m	1.981 m	3.37 m ²	2.362 m	2.184 m
22900.42	3.90 m ²	1.981 m	0.457 m	2.438 m	1.981 m	3.93 m ²	2.642 m	2.184 m
22900.48	4.46 m ²	2.261 m	0.457 m	2.718 m	1.981 m	4.48 m ²	2.921 m	2.184 m
22900.56	5.20 m ²	2.642 m	0.457 m	3.099 m	1.981 m	5.23 m ²	3.302 m	2.184 m
22900.64	5.95 m ²	3.023 m	0.457 m	3.480 m	1.981 m	5.99 m ²	3.683 m	2.184 m
22900.72	6.69 m ²	3.378 m	0.457 m	3.835 m	1.981 m	6.69 m ²	4.039 m	2.184 m
22900.80	7.43 m ²	3.759 m	0.610 m	4.369 m	1.981 m	7.45 m ²	4.572 m	2.184 m
22900.88	8.18 m ²	4.140 m	0.610 m	4.750 m	1.981 m	8.20 m ²	4.953 m	2.184 m
22900.96	8.92 m ²	4.521 m	0.610 m	5.131 m	1.981 m	8.96 m ²	5.334 m	2.184 m
22900.104	9.66 m ²	4.877 m	0.610 m	5.486 m	1.981 m	9.66 m ²	5.690 m	2.184 m
22900.112	10.41 m ²	5.258 m	0.610 m	5.867 m	1.981 m	10.42 m ²	6.071 m	2.184 m
22900.120	11.15 m ²	5.639 m	0.610 m	6.248 m	1.981 m	11.17 m ²	6.452 m	2.184 m
22900.128	11.89 m ²	6.020 m	0.610 m	6.629 m	1.981 m	11.93 m ²	6.833 m	2.184 m
22900.136	12.63 m ²	6.401 m	0.610 m	7.010 m	1.981 m	12.68 m ²	7.214 m	2.184 m
22900.144	13.38 m ²	6.756 m	0.610 m	7.366 m	1.981 m	13.39 m ²	7.569 m	2.184 m
22900.152	14.12 m ²	7.137 m	0.610 m	7.747 m	1.981 m	14.14 m ²	7.950 m	2.184 m

*Typical filter sizes. Custom sizes available.



MicroFlo Vacuum Sand Filter Capacities - Imperial Values

VSF CAPACITIES - IMPERIAL VALUES							
MODEL NUMBER	NOMINAL FILTRATION AREA	FLOW RATE AT 10 GPM/FT²	FLOW RATE AT 12 GPM/FT²	FLOW RATE AT 15 GPM/FT²	POOL CAPACITY AT 2 HR TURNOVER	POOL CAPACITY AT 4 HR TURNOVER	POOL CAPACITY AT 6 HR TURNOVER
22900.24	24 ft²	240.0 GPM			28,800 gal	57,600 gal	86,400 gal
			288.0 GPM		34,560 gal	69,120 gal	103,680 gal
				360.0 GPM	43,200 gal	86,400 gal	129,600 gal
22900.30	30 ft²	300.0 GPM			36,000 gal	72,000 gal	108,000 gal
			360.0 GPM		43,200 gal	86,400 gal	129,600 gal
				450.0 GPM	54,000 gal	108,000 gal	162,000 gal
22900.36	36 ft²	360.0 GPM			43,200 gal	86,400 gal	129,600 gal
			432.0 GPM		51,840 gal	103,680 gal	155,520 gal
				540.0 GPM	64,800 gal	129,600 gal	194,400 gal
22900.42	42 ft²	420.0 GPM			50,400 gal	100,800 gal	151,200 gal
			504.0 GPM		60,480 gal	120,960 gal	181,440 gal
				630.0 GPM	75,600 gal	151,200 gal	226,800 gal
22900.48	48 ft²	480.0 GPM			57,600 gal	115,200 gal	172,800 gal
			576.0 GPM		69,120 gal	138,240 gal	207,360 gal
				720.0 GPM	86,400 gal	172,800 gal	259,200 gal
22900.56	56 ft²	560.0 GPM			67,200 gal	134,400 gal	201,600 gal
			672.0 GPM		80,640 gal	161,280 gal	241,920 gal
				840.0 GPM	100,800 gal	201,600 gal	302,400 gal
22900.64	64 ft²	640.0 GPM			76,800 gal	153,600 gal	230,400 gal
			768.0 GPM		92,160 gal	184,320 gal	276,480 gal
				960.0 GPM	115,200 gal	230,400 gal	345,600 gal
22900.72	72 ft²	720.0 GPM			86,400 gal	172,800 gal	259,200 gal
			864.0 GPM		103,680 gal	207,360 gal	311,040 gal
				1,080.0 GPM	129,600 gal	259,200 gal	388,800 gal
22900.80	80 ft²	800.0 GPM			96,000 gal	192,000 gal	288,000 gal
			960.0 GPM		115,200 gal	230,400 gal	345,600 gal
				1,200.0 GPM	144,000 gal	288,000 gal	432,000 gal
22900.88	88 ft²	880.0 GPM			105,600 gal	211,200 gal	316,800 gal
			1,056.0 GPM		126,720 gal	253,440 gal	380,160 gal
				1,320.0 GPM	158,400 gal	316,800 gal	475,200 gal
22900.96	96 ft²	960.0 GPM			115,200 gal	230,400 gal	345,600 gal
			1,152.0 GPM		138,240 gal	276,480 gal	414,720 gal
				1,440.0 GPM	172,800 gal	345,600 gal	518,400 gal
22900.104	104 ft²	1,040.0 GPM			124,800 gal	249,600 gal	374,400 gal
			1,248.0 GPM		149,760 gal	299,520 gal	449,280 gal
				1,560.0 GPM	187,200 gal	374,400 gal	561,600 gal
22900.112	112 ft²	1,120.0 GPM			134,400 gal	268,800 gal	403,200 gal
			1,344.0 GPM		161,280 gal	322,560 gal	483,840 gal
				1,680.0 GPM	201,600 gal	403,200 gal	604,800 gal
22900.120	120 ft²	1,200.0 GPM			144,000 gal	288,000 gal	432,000 gal
			1,440.0 GPM		172,800 gal	345,600 gal	518,400 gal
				1,800.0 GPM	216,000 gal	432,000 gal	648,000 gal
22900.128	128 ft²	1,280.0 GPM			153,600 gal	307,200 gal	460,800 gal
			1,536.0 GPM		184,320 gal	368,640 gal	552,960 gal
				1,920.0 GPM	230,400 gal	460,800 gal	691,200 gal
22900.136	136 ft²	1,360.0 GPM			163,200 gal	326,400 gal	489,600 gal
			1,632.0 GPM		195,840 gal	391,680 gal	587,520 gal
				2,040.0 GPM	244,800 gal	489,600 gal	734,400 gal
22900.144	144 ft²	1,440.0 GPM			172,800 gal	345,600 gal	518,400 gal
			1,728.0 GPM		207,360 gal	414,720 gal	622,080 gal
				2,160.0 GPM	259,200 gal	518,400 gal	777,600 gal
22900.152	152 ft²	1,520.0 GPM			182,400 gal	364,800 gal	547,200 gal
			1,824.0 GPM		218,880 gal	437,760 gal	656,640 gal
				2,280.0 GPM	273,600 gal	547,200 gal	820,800 gal



MicroFlo Vacuum Sand Filter Capacities - Metric Values

VSF CAPACITIES - METRIC VALUES							
MODEL NUMBER	NOMINAL FILTRATION AREA	FLOW RATE AT 25 m ³ /hr/m ²	FLOW RATE AT 30 m ³ /hr/m ²	FLOW RATE AT 36 m ³ /hr/m ²	POOL CAPACITY AT 2 HR TURNOVER	POOL CAPACITY AT 4 HR TURNOVER	POOL CAPACITY AT 8 HR TURNOVER
22900.24	2.23 m ²	55.7 m ³ /hr			111.5 m ³	223.0 m ³	334.5 m ³
			66.9 m ³ /hr		133.8 m ³	267.6 m ³	401.3 m ³
				80.3 m ³ /hr	160.5 m ³	321.1 m ³	481.6 m ³
22900.30	2.79 m ²	69.7 m ³ /hr			139.4 m ³	278.7 m ³	418.1 m ³
			83.6 m ³ /hr		167.2 m ³	334.5 m ³	501.7 m ³
				100.3 m ³ /hr	200.7 m ³	401.3 m ³	602.0 m ³
22900.36	3.34 m ²	83.6 m ³ /hr			167.2 m ³	334.5 m ³	501.7 m ³
			100.3 m ³ /hr		200.7 m ³	401.3 m ³	602.0 m ³
				120.4 m ³ /hr	240.8 m ³	481.6 m ³	722.4 m ³
22900.42	3.90 m ²	97.5 m ³ /hr			195.1 m ³	390.2 m ³	585.3 m ³
			117.1 m ³ /hr		234.1 m ³	468.2 m ³	702.3 m ³
				140.5 m ³ /hr	280.9 m ³	561.9 m ³	842.8 m ³
22900.48	4.46 m ²	111.5 m ³ /hr			223.0 m ³	445.9 m ³	668.9 m ³
			133.8 m ³ /hr		267.6 m ³	535.1 m ³	802.7 m ³
				160.5 m ³ /hr	321.1 m ³	642.1 m ³	963.2 m ³
22900.56	5.20 m ²	130.1 m ³ /hr			260.1 m ³	520.3 m ³	780.4 m ³
			156.1 m ³ /hr		312.2 m ³	624.3 m ³	936.5 m ³
				187.3 m ³ /hr	374.6 m ³	749.2 m ³	1,123.8 m ³
22900.64	5.95 m ²	148.6 m ³ /hr			297.3 m ³	594.6 m ³	891.9 m ³
			178.4 m ³ /hr		356.7 m ³	713.5 m ³	1,070.2 m ³
				214.0 m ³ /hr	428.1 m ³	856.2 m ³	1,284.3 m ³
22900.72	6.69 m ²	167.2 m ³ /hr			334.5 m ³	668.9 m ³	1,003.4 m ³
			200.7 m ³ /hr		401.3 m ³	802.7 m ³	1,204.0 m ³
				240.8 m ³ /hr	481.6 m ³	963.2 m ³	1,444.8 m ³
22900.80	7.43 m ²	185.8 m ³ /hr			371.6 m ³	743.2 m ³	1,114.8 m ³
			223.0 m ³ /hr		445.9 m ³	891.9 m ³	1,337.8 m ³
				267.6 m ³ /hr	535.1 m ³	1,070.2 m ³	1,605.4 m ³
22900.88	8.18 m ²	204.4 m ³ /hr			408.8 m ³	817.5 m ³	1,226.3 m ³
			245.3 m ³ /hr		490.5 m ³	981.1 m ³	1,471.6 m ³
				294.3 m ³ /hr	588.6 m ³	1,177.3 m ³	1,765.9 m ³
22900.96	8.92 m ²	223.0 m ³ /hr			445.9 m ³	891.9 m ³	1,337.8 m ³
			267.6 m ³ /hr		535.1 m ³	1,070.2 m ³	1,605.4 m ³
				321.1 m ³ /hr	642.1 m ³	1,284.3 m ³	1,926.4 m ³
22900.104	9.66 m ²	241.5 m ³ /hr			483.1 m ³	966.2 m ³	1,449.3 m ³
			289.9 m ³ /hr		579.7 m ³	1,159.4 m ³	1,739.1 m ³
				347.8 m ³ /hr	695.7 m ³	1,391.3 m ³	2,087.0 m ³
22900.112	10.41 m ²	260.1 m ³ /hr			520.3 m ³	1,040.5 m ³	1,560.8 m ³
			312.2 m ³ /hr		624.3 m ³	1,248.6 m ³	1,872.9 m ³
				374.6 m ³ /hr	749.2 m ³	1,498.3 m ³	2,247.5 m ³
22900.120	11.15 m ²	278.7 m ³ /hr			557.4 m ³	1,114.8 m ³	1,672.3 m ³
			334.5 m ³ /hr		668.9 m ³	1,337.8 m ³	2,006.7 m ³
				401.3 m ³ /hr	802.7 m ³	1,605.4 m ³	2,408.0 m ³
22900.128	11.89 m ²	297.3 m ³ /hr			594.6 m ³	1,189.2 m ³	1,783.7 m ³
			356.7 m ³ /hr		713.5 m ³	1,427.0 m ³	2,140.5 m ³
				428.1 m ³ /hr	856.2 m ³	1,712.4 m ³	2,568.6 m ³
22900.136	12.63 m ²	315.9 m ³ /hr			631.7 m ³	1,263.5 m ³	1,895.2 m ³
			379.0 m ³ /hr		758.1 m ³	1,516.2 m ³	2,274.3 m ³
				454.9 m ³ /hr	909.7 m ³	1,819.4 m ³	2,729.1 m ³
22900.144	13.38 m ²	334.5 m ³ /hr			668.9 m ³	1,337.8 m ³	2,006.7 m ³
			401.3 m ³ /hr		802.7 m ³	1,605.4 m ³	2,408.0 m ³
				481.6 m ³ /hr	963.2 m ³	1,926.4 m ³	2,889.7 m ³
22900.152	14.12 m ²	353.0 m ³ /hr			706.1 m ³	1,412.1 m ³	2,118.2 m ³
			423.6 m ³ /hr		847.3 m ³	1,694.6 m ³	2,541.8 m ³
				508.4 m ³ /hr	1,016.7 m ³	2,033.5 m ³	3,050.2 m ³



MicroFlo Vacuum Sand Filter Media Data

ESTIMATED WEIGHTS

VSF MEDIA DATA - IMPERIAL VALUES								
MODEL NUMBER	NOMINAL FILTRATION AREA	FILTER SAND VOLUME REQUIRED	FILTER SAND WEIGHT	SUPPORT GRAVEL VOLUME	SUPPORT GRAVEL WEIGHT	TOTAL MEDIA WEIGHT	ESTIMATED DRY TANK WEIGHT	TOTAL OPERATING WEIGHT
22900.24	24 ft ²	40.0 ft ³	4,000.0 lb	8.0 ft ³	800.0 lb	4,800.0 lb	3,200.0 lb	14,425.0 lb
22900.30	30 ft ²	50.0 ft ³	5,000.0 lb	10.0 ft ³	1,000.0 lb	6,000.0 lb	4,000.0 lb	17,662.0 lb
22900.36	36 ft ²	60.0 ft ³	6,000.0 lb	12.0 ft ³	1,200.0 lb	7,200.0 lb	4,700.0 lb	20,800.0 lb
22900.42	42 ft ²	70.0 ft ³	7,000.0 lb	14.0 ft ³	1,400.0 lb	8,400.0 lb	5,500.0 lb	24,040.0 lb
22900.48	48 ft ²	80.0 ft ³	8,000.0 lb	16.0 ft ³	1,600.0 lb	9,600.0 lb	6,250.0 lb	27,230.0 lb
22900.56	56 ft ²	93.3 ft ³	9,333.3 lb	18.7 ft ³	1,866.7 lb	11,200.0 lb	7,300.0 lb	31,570.0 lb
22900.64	64 ft ²	106.7 ft ³	10,666.7 lb	21.3 ft ³	2,133.3 lb	12,800.0 lb	8,400.0 lb	35,960.0 lb
22900.72	72 ft ²	120.0 ft ³	12,000.0 lb	24.0 ft ³	2,400.0 lb	14,400.0 lb	9,400.0 lb	40,150.0 lb
22900.80	80 ft ²	133.3 ft ³	13,333.3 lb	26.7 ft ³	2,666.7 lb	16,000.0 lb	10,500.0 lb	44,550.0 lb
22900.88	88 ft ²	146.7 ft ³	14,666.7 lb	29.3 ft ³	2,933.3 lb	17,600.0 lb	11,500.0 lb	48,850.0 lb
22900.96	96 ft ²	160.0 ft ³	16,000.0 lb	32.0 ft ³	3,200.0 lb	19,200.0 lb	12,500.0 lb	53,450.0 lb
22900.104	104 ft ²	173.3 ft ³	17,333.3 lb	34.7 ft ³	3,466.7 lb	20,800.0 lb	13,650.0 lb	57,800.0 lb
22900.112	112 ft ²	186.7 ft ³	18,666.7 lb	37.3 ft ³	3,733.3 lb	22,400.0 lb	14,650.0 lb	62,050.0 lb
22900.120	120 ft ²	200.0 ft ³	20,000.0 lb	40.0 ft ³	4,000.0 lb	24,000.0 lb	15,650.0 lb	66,400.0 lb
22900.128	128 ft ²	213.3 ft ³	21,333.3 lb	42.7 ft ³	4,266.7 lb	25,600.0 lb	16,750.0 lb	70,750.0 lb
22900.136	136 ft ²	226.7 ft ³	22,666.7 lb	45.3 ft ³	4,533.3 lb	27,200.0 lb	17,750.0 lb	75,050.0 lb
22900.144	144 ft ²	240.0 ft ³	24,000.0 lb	48.0 ft ³	4,800.0 lb	28,800.0 lb	18,750.0 lb	79,210.0 lb
22900.152	152 ft ²	253.3 ft ³	25,333.3 lb	50.7 ft ³	5,066.7 lb	30,400.0 lb	20,000.0 lb	83,800.0 lb

ESTIMATED WEIGHTS

VSF MEDIA DATA - METRIC VALUES								
MODEL NUMBER	NOMINAL FILTRATION AREA	FILTER SAND VOLUME REQUIRED	FILTER SAND WEIGHT	SUPPORT GRAVEL VOLUME	SUPPORT GRAVEL WEIGHT	TOTAL MEDIA WEIGHT	ESTIMATED DRY TANK WEIGHT	TOTAL OPERATING WEIGHT
22900.24	2.23 m ²	1.13 m ³	1,814.4 kg	0.23 m ³	362.9 kg	2,177.2 kg	1,451.5 kg	6,543.1 kg
22900.30	2.79 m ²	1.42 m ³	2,268.0 kg	0.28 m ³	453.6 kg	2,721.6 kg	1,814.4 kg	8,011.3 kg
22900.36	3.34 m ²	1.70 m ³	2,721.6 kg	0.34 m ³	544.3 kg	3,265.9 kg	2,131.9 kg	9,434.7 kg
22900.42	3.90 m ²	1.98 m ³	3,175.1 kg	0.40 m ³	635.0 kg	3,810.2 kg	2,494.8 kg	10,904.4 kg
22900.48	4.46 m ²	2.27 m ³	3,628.7 kg	0.45 m ³	725.7 kg	4,354.5 kg	2,835.0 kg	12,351.3 kg
22900.56	5.20 m ²	2.64 m ³	4,233.5 kg	0.53 m ³	846.7 kg	5,080.2 kg	3,311.2 kg	14,319.9 kg
22900.64	5.95 m ²	3.02 m ³	4,838.3 kg	0.60 m ³	967.7 kg	5,806.0 kg	3,810.2 kg	16,311.2 kg
22900.72	6.69 m ²	3.40 m ³	5,443.1 kg	0.68 m ³	1,088.6 kg	6,531.7 kg	4,263.8 kg	18,211.7 kg
22900.80	7.43 m ²	3.78 m ³	6,047.9 kg	0.76 m ³	1,209.6 kg	7,257.5 kg	4,762.7 kg	20,207.5 kg
22900.88	8.18 m ²	4.15 m ³	6,652.7 kg	0.83 m ³	1,330.5 kg	7,983.2 kg	5,216.3 kg	22,158.0 kg
22900.96	8.92 m ²	4.53 m ³	7,257.5 kg	0.91 m ³	1,451.5 kg	8,709.0 kg	5,669.9 kg	24,244.5 kg
22900.104	9.66 m ²	4.91 m ³	7,862.3 kg	0.98 m ³	1,572.5 kg	9,434.7 kg	6,191.5 kg	26,217.6 kg
22900.112	10.41 m ²	5.29 m ³	8,467.1 kg	1.06 m ³	1,693.4 kg	10,160.5 kg	6,645.1 kg	28,145.4 kg
22900.120	11.15 m ²	5.66 m ³	9,071.8 kg	1.13 m ³	1,814.4 kg	10,886.2 kg	7,098.7 kg	30,118.5 kg
22900.128	11.89 m ²	6.04 m ³	9,676.6 kg	1.21 m ³	1,935.3 kg	11,612.0 kg	7,597.7 kg	32,091.6 kg
22900.136	12.63 m ²	6.42 m ³	10,281.4 kg	1.28 m ³	2,056.3 kg	12,337.7 kg	8,051.3 kg	34,042.1 kg
22900.144	13.38 m ²	6.80 m ³	10,886.2 kg	1.36 m ³	2,177.2 kg	13,063.4 kg	8,504.9 kg	35,929.0 kg
22900.152	14.12 m ²	7.17 m ³	11,491.0 kg	1.43 m ³	2,298.2 kg	13,789.2 kg	9,071.8 kg	38,011.0 kg



MicroFlo Vacuum Sand Product Specification

1.1 SUMMARY

- A. The filter system shall be a Series 22900 Compact Vacuum Sand Filter as manufactured by Natare Corporation, Indianapolis, Indiana. It shall have a total effective filter area of ___ square feet and shall have the capacity to filter _____ gallons in ___ hours when operated at a re-circulating rate of ___ gpm per square foot of filter area.
- B. The filtration system specified is to be a MicroFlo® Vacuum Sand Filter System, which is the proprietary product and sole property of Natare Corporation, Indianapolis, Indiana. All other aspects and equipment within the swimming pool system have been designed to utilize its principles. No alternatives will be accepted under this base bid as they could adversely affect the ultimate performance of the system.

1.2 SYSTEM DESCRIPTION

- A. The filter system shall be a complete and operating vacuum sand swimming pool filter system designed for use with a single grade of filter media. It shall be fabricated and shipped as a complete single unit ready to be set in place and connected to the remainder of the pool piping. The unit shall consist of a freestanding, self-supporting stainless steel filter system with all required controls, valves and accessories. The top of the tank shall be covered with a structural grating to provide a secure walkway for filter maintenance and shall provide support for valve extension shafts. The area above the filter bed shall contain the circulating pump(s), piping, valves and related equipment.
- B. Backwashing of the unit shall be accomplished either as indicated by the enclosed drawings or by pumping the water through the header and sand bed in the direction opposite to the direction of normal circulation or by reversing the flow of water from the main drain into the balance tank and through the media bed to cause a uniform expansive flow of water upward through the filter laterals and media. If the pump is not used for backwash, backwash shall be accomplished by using the available head pressure provided by the elevation of water in the pool. Backwash flow shall be precisely controlled.

1.3 SUBMITTALS

- A. Upon notice to proceed under this Contract, installation details and submittal documents will be provided, fully illustrating the materials and procedures to be utilized. These details and submittal documents, once accepted by the Owner or Owner's Representative, shall be the basis for the fabrication, installation and inspection of the installation.
- B. Product Data: Submit manufacturer's technical information and product data including basic materials, configuration and design details for the filtration system including, the following:
 - 1. List each material and item, cross-referenced to the shop drawing, and identify by manufacturer's name.
 - 2. Provide dimensional shop drawing showing all pertinent dimensions in plan, section and elevation.
- C. Submit operations and maintenance manuals covering operating and maintaining the filter systems. Provide complete descriptive information detailing proper care, maintenance and cleaning of the system.
- D. Coordination Drawings: Plans, sections, and elevations drawn to scale and coordinating installation of the filtration system with related equipment and systems. Size and location of piping connections are to be shown.

1.4 QUALITY ASSURANCE

- A. The method of water circulation specified and shown on the detailed drawings is intended as the basis for receiving bids and is the preference of the Owners. It is not the intent of these specifications to in any way limit competition or restrict the bidder in the preparation of his bid. It is assumed however that unless otherwise stated that the bidder is offering the equipment, products, quantities of items as specified herein and is totally obligated to furnish that equipment in literal compliance with these specifications.
 - 1. Substitute system(s) or substitute manufacturers must be approved by the Architect/Engineer a minimum of ten (10) days prior to the bid opening date by submitting a full equipment list of all items he intends to supply showing filter tank, re-circulating pump, automatic features, engineering and other pertinent data as outlined in the Specifications. Said request for substitution should include a detailed explanation of why a substitute is being requested. In the event an alternate system is approved all contractors will be so advised per addendum prior to bid opening allowing all contractors a fair and equitable opportunity to include such a system or equipment in their bids.



- B. Compliance with Local Requirements: Comply with applicable building code, local ordinances and regulations, and requirements of authorities having jurisdiction.
- C. The filter system shall be manufactured by a company regularly involved in the manufacture of swimming pool filters and equipment for a minimum of ten (10) years and at least five (5) systems of similar size and capacity in current operation. It shall be guaranteed in workmanship, material and performance for a period of five (5) years and a structural warranty of a period of fifteen (15) years. The guarantee shall cover all labor and costs for the replacement of any defective materials and/or work but shall not cover conditions or damages brought about by improper or abusive treatment by others, and shall not cover the normal wear of any component. Mechanical components other than the filter tank shall be warranted for a period of one year against defects in materials or workmanship, or as warranted by the manufacturer of that component.
- D. The filter manufacturer shall guarantee that the filter, if operated in accordance with the written instructions and operating information provided, will perform in complete accordance with these specifications.

1.5 PROJECT SITE CONDITIONS

- A. The project site shall be in accordance with the Manufacturer's technical bulletins. An adequate concrete foundation or structural support to accommodate tank weight shall be provided.

1.6 MANUFACTURERS

- A. Manufacturers: Natare Corporation, Indianapolis, Indiana. All bids shall include only equipment from this manufacturer.
- B. Source Limitations: Filtration system components through one source from a single manufacturer whose products are listed with the National Sanitation Foundation at the time of bidding.

1.7 FUNCTIONAL DESCRIPTION OF SYSTEM

- A. The filter system shall include an integral chamber providing a balancing reservoir over a permanent media bed of sand. The main drain and perimeter gutter line of the swimming pool shall communicate directly into the balancing reservoir. Flow to the media bed shall be uniformly distributed through a semi-permeable stainless steel diffusion screen located above the media.
- B. The filtration area shall consist of a bed of sand and supporting bed of gravel over a central collection system consisting of a stainless steel header integral with the filter vessel and a series of machined schedule 80 PVC multiple filter element laterals. An integral baffle diffuser grate and backwash trough is to be provided above the maximum expanded bed to convey backwash discharge from the filter compartment. The filter shall have **National Sanitation Foundation (NSF)** approval and listing for a filtration rate up to 20 gallons per minute, per square foot to insure the quality of design.
- C. The filter shall be capable of producing an effluent with turbidity not exceeding 0.5 FTU when measured with a Hach 1120A Turbidity Meter.
- D. Filter media shall be uniformly graded silica sand, containing no limestone or clay. Sand shall be grade #20 with an effective size of .45 to .55 millimeter and a maximum uniformity coefficient of 1.4. Support media shall be uniformly graded 1/8" -1/4" water-rounded silica gravel, containing no limestone or clay. Alternate media must be approved by the filter manufacturer.
- E. Tank Construction: The filter tank, baffle and header shall be constructed of 12-gauge low carbon certified 316 stainless steel. The exterior of the filter vessel shall be reinforced by structural shapes conforming to ASTM A36, (T304L & T316L Optional) and the entire exterior shall be coated after assembly with an epoxy corrosion resistant coating. Schedule 80 PVC or stainless steel flanges shall be provided in the size and quantity as shown on the drawings.
- F. Energy Dissipation Grate: Water entering the filter shall be directed over an energy dissipating stainless steel diffuser with machined orifices, which shall completely cover the sand bed to assure optimum distribution of incoming water and prevent excessive turbulence that could cause displacement of the media. The diffuser shall sustain a uniformly distributed load of 100 pounds per square foot. No cyclac or fiberglass grates or screens of any kind will be acceptable.
- G. Filter Header and Laterals: The header collector and lateral system of the sand bed shall consist of a pressure equalizing integral stainless steel under-drain distributor with machined PVC laterals having appropriately sized orifices designed to retain the sand while allowing the passage of water with minimum head loss. Each lateral shall include an extruded outer polypropylene sleeve for reinforcing and media distribution, which provides at least 80% open area. Systems utilizing simple PVC pipe headers or plastic (ABS) laterals requiring stainless steel screens to retain media are not acceptable.



- H. The filter shall include the re-circulating pump(s), gauges and controls, all piping and valves as indicated on the drawings within the limits of the tank, and a 2" coupling to allow for electrical connection. All piping provided with the filter shall be schedule 80 PVC. The filter system shall be shipped completely plumbed, with all internal operational piping installed.
- I. Filter valves: All valves 3" and larger shall be wafer-type PVC butterfly valves with PVC body suitable for use with ANSI Standard schedule 80 PVC flanges; valves smaller than 3" shall be PVC ball valves. PVC valves shall be Asahi, Chemtrol, G.F. or approved equal. No metallic, cast iron or other coated valves are acceptable
1. PVC wafer type butterfly valves shall be PVC body with ANSI full face flanges for use with schedule 80 PVC flanges, with PVC or PVDF disc (No polypropylene), non-wetted 316 stainless steel shaft and EPDM or Teflon seats as required by swimming pool chemical concentrations.
 - a. Provide with infinite throttling, memory stop lever handles up to 6", and provide with an appropriate AWWA nut and mechanically connected removable stainless steel extensions, sized to the proper length for operation above the walkway grating.
 - b. **(Optional)** For valves larger than 6", furnish with appropriate gear operator above the grating and secure gear operators with bracket or bracing as required for the operation so that all normal operational valves can be operated without entering the filter tank or removing the PVC walkway grating. All operators are to be epoxy coated for corrosive environment.
 2. **(Optional)** Automatic Valve Actuation System: An automatic valve actuation system shall be provided within the confines of the filter, which can be actuated by the operator either manually or automatically by the air release and vacuum limit control system. The system shall consist of pneumatically powered actuators that automatically sequence the filter valves to any of four positions (Filtration, Drain-down, Backwash, Pool drain) using a single switch Series 3200 digital filtration control system and dedicated PLC controller. The valve actuation system shall be failsafe in a filtration mode. All actuators shall be mounted above the top filter grating for easy access and operation and shall connect to the system valves using machined stainless steel extensions. To eliminate valve corrosion, binding and deterioration, systems using cylinder-operated valves or valve actuation systems below water level will not be acceptable. The automatic valve actuation system shall be provided with all required controls, gauges, and valves, interconnecting tubing, connections and sensors. Motor starters, 120-volt electrical service and electrical connections are to be provided by the electrical contractor.
 3. PVC ball valves shall be Series 32-000, single union type, which allow access to the valve interior without damaging or disconnecting the pipe.
 4. Absolutely no cast iron or coated valves shall be used with the filter.
- J. The swimming pool re-circulating pump(s) shall be a straight centrifugal close-coupled pump mounted within the confines of the filter. The pump shall be PACO pump and shall have a cast iron pump body close-coupled to standard HI-NEMA-JM, ___ hp, 230/460 volt, ___ phase, (1750/3500) rpm, open drip-proof motor (**TEFC Optional**). The pump shall have a dynamically-balanced cast iron impeller key locked to the shaft, and shall have the capacity to pump ___ gpm with a TDH of ___ ft.
1. An AC magnetic across the line HOA starter(s) with 115-volt hold coil and electrically held contactor shall be provided. Starter, push button station, electrical power, disconnects and electrical connections are to be provided by the electrical contractor.
 2. **(Optional)** Griswold Flow Controllers: The pool pump discharge shall be provided with an automatic flow controller that maintains constant discharge flow regardless of system conditions. The flow controller on the pool supply line shall be ___ " and shall be preset to assure a flow of ___ gpm within a control range of 2- to 32-psi. The flow controller shall have a cast iron body with stainless steel spring-loaded internal cartridges that modulate the flow with an accuracy of +/- 5%. It shall mount between two standard flanges and shall have pressure taps in the body to allow verification of working pressure differential during operation.
 3. **(Optional)** Automatic Surge Recovery System: An automatic surge recovery pump shall be provided within the confines of the filter. The surge recovery pump shall be actuated by a surge recovery control system that senses water levels in the perimeter gutter to assure adequate capacity in the perimeter system during periods of high surge. The surge recovery system shall be provided with all required controls, gauges, valves connections and sensors. Starters and electrical connections are to be provided by the electrical contractor.
 - c. The pump shall be an end suction centrifugal PACO pump and shall have a cast iron pump body close-coupled to standard HI-NEMA-JM, ___ hp, 230/460 volt, ___ phase, (1750/3500) rpm, open drip-proof motor. The pump shall have a dynamically-balanced cast iron impeller key locked to the shaft, and shall have the capacity to pump ___ gpm with a TDH of ___ ft.
 4. Filter control system: The filter shall be provided with a Series 32000 filter control system and dual range vacuum limit controller to allow the system to operate within a vacuum range of 1" to 15" of mercury. The filter control system shall provide the capability to stop the re-circulating pump at regular, field settable intervals to automatically release air from the filter bed and to start the re-circulating pump when the air release cycle is complete.



5. The automatic air release and vacuum limit system requires a 115 volt, 60 cycle, 10 amp supply circuit and connection to the electrically held pump contactor of the motor starter, all of which are to be provided by the electrical contractor
 6. The filter shall be automatically operated by the vacuum limit controller. When a pre-set vacuum is reached, the filter pump shall shut down indicating that the filter requires cleaning.
 7. Provide a variable impact type rate of flow indicator installed at the appropriate distance downstream from the pump discharge.
 8. **(Optional)** Low Water Sensor: The filter control system shall be provided with an electronic water level sensor, which is interlocked with the system control panel to either shut down the system or sound an alarm, if the water level in the tank becomes dangerously low.
 9. **(Optional)** Automatic Water Level Control System: The filter control system shall be provided with a solid state, programmable water level control system, Natare Series 32550 that provides automatic and manual water level control in the swimming pool. The water level control system shall be provided with sensing unit and housing for poolside installation, solenoid valve and time delay adjustable control sensors.
 10. **(Optional)** Electronic Filter Monitoring System: The filter control system shall be provided with a solid state temperature indicating system and an electronic flow meter, mounted in a unitized control center console with liquid-filled 4 inch stainless steel gauges indicating pump suction (compound) and discharge (pressure) conditions.
 11. **(Optional)** Variable Frequency Drive: The variable frequency drive shall be provided to control the re-circulating pump. It shall improve efficiency and performance, save costs, reduce maintenance, be adjustable, provide additional safety and protection, be easy to use, and specifically designed for aquatic applications.
 12. **(Optional)** Medium-Pressure UV Lamp Disinfection System: The medium-pressure UV lamp disinfection system shall include equipment, materials, accessories, and supplier's services required to provide a closed vessel, pressurized flow, medium-pressure ultraviolet (UV) lamp disinfection system with a UV intensity monitoring system. The UV system shall be complete and operational with all control equipment and accessories.
 13. **(Optional)** Gen II filtration control system.
- K. Backwash shall be accomplished by using the available head pressure provided by the differential elevation to the pool water level or by the use of the pool re-circulating pump(s). Backwash flow shall be precisely controlled.
1. Filter backwash shall be accomplished in conjunction with an air assisted, low-flow backwash system that injects a pressurized stream of low (ambient) temperature air into the stainless steel manifold through a diffuser assembly to provide collapsed pulse backwash through maximum expansion created by the air entrained water source. An air supply of approximately 5-scfm per square foot of filter area for backwash shall be provided at approximately 5-psig by remote air compressor and receiver or blower, with a __ hp, _____ volt, __ phase motor. Starter, push button station, electrical power, disconnects and electrical connections are provided by the electrical contractor.
 2. **(Optional)** Automatic Backwash Control System: An automatic backwash control system shall be provided within the confines of the filter, which can be actuated by the operator either manually or automatically by the air release and vacuum limit control system. The system shall initiate, monitor and complete all operations required for the complete, through and fully automatic backwash of the filter system without manual or operator intervention. The backwash cycle is automatically initiated by time in service, filter operating pressures, flow or any combination of filtration parameters. The system shall include of pneumatically powered actuators that automatically sequence the filter valves through all required positions (Filtration, Drain-down, Backwash) using a single switch Series 3200 digital filtration control system and dedicated PLC controller. The control system shall include a digital, touch pad operated control system that displays the status of all operations and allows program changes by the operator. The valve actuation system shall be failsafe in a filtration mode. All actuators shall be mounted above the top filter grating for easy access and operation and shall connect to the system valves using machined stainless steel extensions. To eliminate valve corrosion, binding and deterioration—systems using cylinder-operated valves or valve actuation systems below water level will not be acceptable. The automatic backwash control system shall be provided with all required controls, gauges, and valves, interconnecting tubing, connections and sensors. Motor starters, 120-volt electrical service and electrical connections are to be provided by the electrical contractor.
- L. Start-up and Operator Training: A qualified representative of the filter system manufacturer shall visit the jobsite after the installation of the filter system is complete and shall put into operation all mechanical equipment and assist and instruct the Owner's representative in the operation of such equipment.

Note: This product specification is available for download on our website: www.natare.com



Sample Warranty and Warranty Details

Natare Corporation MicroFlo™ Vacuum Sand Filtration System Sample Warranty

NATARE CORPORATION (“Natare”) hereby provides exclusively to the original Owner the warranties contained herein (“Warranty”), related to the Natare MicroFlo Filter System, (“Filter”) provided by Natare for a project (“Project”), and it is expressly understood and acknowledged by Natare and the Owner that the Project and this Statement of Warranty relate solely to a commercial transaction.

Natare expressly WARRANTS that the Filter is comprised of new materials, which were manufactured in a workmanlike manner in accordance with Natare drawings, submittals, specifications, and technical details. Natare further expressly warrants that the Filter, if installed and utilized in accordance with Natare’s written instructions, industry standards and proper practice and recommended Pool and Spa Water Chemistry Standards, will perform in a proper and workmanlike manner under normal and intended use and service for a period of one (1) year beginning on the Effective Date of Warranty as written below.

Natare further expressly WARRANTS that, commencing upon the delivery of the Filter to the Owner, the Filter shall be free from defects in materials and workmanship for a period of ten (10)-years and the stainless steel structure for a period of fifteen (15)-years.

The warranty described herein is provided solely with regard to a Filter purchased from Natare that was undamaged prior to delivery, installation, or first use. In the event that the Filter’s materials or workmanship shall be found to be defective during the specific terms set forth in this Warranty, Natare agrees that it shall, as soon as practical after receipt of written notice from the Owner, and at its option, either repair or replace the defective part or parts of the Filter, or refund to the Owner the portion of the purchase price attributable to the defective part or parts of the system. Any materials or equipment claimed to be defective must be returned to or inspected by Natare, and Natare shall have the sole right to determine coverage under this Warranty. This warranty covers solely the Filter and does not include labor or installation costs for any items not originally provided and installed by Natare and does not cover inspection costs, regardless of whether this Warranty applies to the Owner’s claims made hereunder.

Specifically exempted from these warranties are claims arising from: normal wear and tear; undue wear and tear, damage or failure due to accident, misuse, abuse, neglect or other conditions exceeding normal use; improper or incorrect operation or maintenance; any use of the product other than the particular use for which the product was intended; structural or earth movements; or acts of God.

Natare further disclaims any and all implied warranties, including but not necessarily limited to the implied warranties of merchantability and fitness for a particular purpose.

In no event shall Natare be liable for any consequential or other damage, losses, or expenses whatsoever, direct or indirect arising in connection with the use or inability to use the Filter for any purpose, except those provided herein. There are no other warranties or guaranties, expressed or implied, given by Natare or its agents except those provided herein. The express warranties described herein are provided solely to the original Owner of a Filter purchased from Natare that was undamaged prior to installation. Goods or equipment not manufactured by Natare are covered only by the standard warranty of the manufacturer, though sold, provided, installed, or operated with Natare goods or equipment. The express warranties described herein are conditional upon payment in full to Natare for any and all charges related to the Filter. Any claims against Natare arising out of or related to this Statement of Warranty must be made in detail and in writing and must be provided to Natare within ten (10) days of the date on which the warranty claim was discovered or reasonably should have been discovered. Any and all disputes, controversies or claims arising out of or related to this Warranty shall be settled by binding private arbitration, which arbitration shall be conducted in accordance with the American Arbitration Association Construction Arbitration Rules then in effect. The parties shall endeavor to mutually agree to an arbitrator who shall hear and decide the dispute. If the parties are unable to agree to an arbitrator, the arbitrator shall be selected through the American Arbitration Association. This Warranty shall be governed by, and interpreted, enforced and construed in accordance with the laws of the State of Indiana. The Owner hereby submits itself to both the subject matter and personal jurisdiction of the State of Indiana, and waives any objection thereto. The Owner agrees that any action brought under this Warranty shall be arbitrated in Marion County, Indiana. All Natare warranties and other duties with respect to material, equipment, systems, or services furnished by Natare shall be conclusively presumed to have been satisfied one day after the expiration of the warranty period as set forth herein. This Warranty supersedes any and all written or oral warranties, promises, or representations made by Natare regarding the Filter.



NATARE CORPORATION
5905 West 74th Street
Indianapolis, IN 46278
(317) 290-8828

EFFECTIVE DATE OF WARRANTY _____

SIGNED BY _____

Get Crystal Clear Water with a
Natare MicroFlo® Vacuum Sand Filter!



Natare Corporation

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(800) 336-8828 | (317) 290-8828 | FAX (317) 290-9998
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