Cloth Media Filtration
Featuring OptiFiber® Pile Cloth Media
In the early 1990s, Aqua-Aerobic Systems revolutionized tertiary treatment by introducing Cloth Media Filtration utilizing a disk configuration. Since then, hundreds of different media have been researched and tested with a select few that are currently being applied to six mechanical configurations in a variety of applications including: water reuse, low level phosphorus, stormwater and primary treatment.

**Effective Depth Filtration**

The original OptiFiber® pile cloth media is specifically engineered for water and wastewater applications and designed to maximize solids removal over a wide range of particle sizes. Deep, thick, pile fibers capture particles for the most effective depth filtration. OptiFiber media is exclusive to the entire line of cloth media filter configurations including:

- AquaDisk®
- Aqua MegaDisk®
- AquaPrime®
- Aqua Storm™
- AquaDiamond®
- Aqua MiniDisk®

**OptiFiber® Media Advantages**

- Woven, precision fibers provide strength and durability
- Discrete pile fibers effectively release solids during backwash
- Open backing minimizes potential for biofouling
- Low backwash volume results in water savings and energy reduction
- Variety of application-specific cloth including 2, 5 & 10 µm nominal pore size media
- Phosphorus removal to 0.075 mg/l or less
- Ability to handle high solids conditions
Engineered Cloth Media

The Media is the most important aspect in any filter design. Today’s OptiFiber® pile cloth filtration media is the result of nearly 30 years of continuous engineering and improvement. Each aspect of the media design is considered in providing an optimal media design to maximize particle removal, allow for effective backwash, and maximize media life.

Hundreds of media options have been tested as part of this continuous development process. Only five of these options have made it through the rigorous testing process and met the quality standards set forth by Aqua-Aerobic Systems, Inc.

Backwash System
EFFECTIVE CLEANING WITH LESS WATER AND ENERGY

Maximum cleaning of the OptiFiber® cloth media is accomplished with a unique backwash system. The backwash shoe makes direct contact with the cloth media and solids are vacuumed from the surface. During backwash, fibers fluidize to provide an efficient release of stored solids deep within the fiber depth.

Backwash System Advantages
• Filtration continues during backwash
• Initiated at a pre-determined liquid level or time
• Low backwash rates
• Less water volume required
• Low energy consumption

A cloth media display showcases samples of tested media with the far left panel featuring OptiFiber® media.

OptiFiber® Cloth Media Technology Timeline

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AquaDisk® Filter
OptiFiber PA2-13® Media
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OptiFiber PES-14® Media
Aqua MegaDisk® Filter
AquaPrime® & AquaStorm™ Filter with OptiFiber PF-14® Media
OptiFiber UFS-9® Ultrafiber Media

Backwash shoe makes direct contact with the media.

Shown is pile cloth media in its natural state (left) and its conditioned state (right).
The cloth media “Disk” configuration was the first to enter the marketplace as an alternative to conventional granular media filtration technologies. This original configuration comprises the majority of Aqua-Aerobic cloth media filters installed today. A history of exceptional operating experience in a variety of municipal and industrial applications continues to make the AquaDisk® the tertiary filter of choice.

**Features and Benefits**

- Vertically oriented cloth media disks reduce required footprint
- Each disk has six lightweight, removable segments for ease of maintenance
- Low hydraulic profile
- Higher solids and hydraulic loading rates
- Low backwash rate
- Available in painted steel, stainless steel or concrete tanks
- Fully automatic PLC control system with color touchscreen HMI
- Low cost of ownership

**Modes of Operation**

Aqua-Aerobic cloth media filter configurations operate on the same (3) modes of operation: FILTRATION, BACKWASH and SOLIDS WASTING.

**Filtration Mode**
- Inlet wastewater enters filter
- Cloth media is completely submerged
- Disks are stationary
- Solids deposit on outside of cloth media forming a mat as filtrate flows through the media
- Tank liquid level rises
- Flow enters the filter by gravity and filtrate is collected inside the disks and discharged
- Heavier solids settle to the tank bottom

**Backwash Mode**
- Solids are backwashed at a predetermined liquid level or time
- Backwash shoes contact the media directly and solids are removed by vacuum pressure using the backwash pump
- Two disks are backwashed at a time (unless a single disk is utilized)
- Disks rotate slowly
- Filtration is not interrupted
- Backwash water is directed to headworks

**Solids Wasting Mode**
- Heavier solids on the tank bottom are removed on an intermittent basis
- Solids are pumped back to the headworks, digester or other solids collection area of the treatment plant
The Aqua MegaDisk® cloth media filter expands on the reliability and exceptional performance of the original AquaDisk filter, but on a larger scale. Each disk is approximately 10’ in diameter. The unit features all of the same benefits and (3) modes of operation as the AquaDisk but with larger disks and fewer mechanical components.

**Additional Features and Benefits**

- Smallest footprint, operating in 80% less space than sand filters with comparable hydraulic capacity
- Up to 24 disks in a single filter, capable of treating 24 MGD
- Ideal for deep bed sand filter retrofits, new plants or expansions
- Lightweight segments removable without a crane

**Footprint Savings Compared to Sand Filters**

![Aqua MegaDisk® (left) compared to AquaDisk® (right).](image)

![Internal view of the Aqua MegaDisk®](image)
The AquaPrime® cloth media filter is ideal for primary wastewater treatment due to its proven removal efficiencies. The main advantages include reduced energy costs in the secondary process due to a reduction in organic loading and more solids for increased gas production in anaerobic digesters for primary applications.

Additional Features and Benefits

- Vertically oriented cloth media disks reduce required footprint
- Each disk is lightweight, with removable segments for ease of maintenance
- Effective backwash system that fluidizes cloth fibers to release stored solids
- Specifically designed floatable and solids removal zones
- Available in several configurations
- Fully automatic PLC control with color touchscreen HMI
- Reduced energy costs in the secondary process due to a reduction in organic loading
- More solids for increased gas production in anaerobic digesters for primary applications
- Simple and automated operation

Modes of Operation

The AquaPrime® cloth media filtration system operates on four (4) modes of operation: **FILTRATION, BACKWASH, SOLIDS WASTING** and **FLOATABLE WASTING**.

**Filtration Mode**
- Inlet wastewater enters filter
- Cloth media is completely submerged
- Disks are stationary
- Solids deposit on outside of cloth media forming a mat as filtrate flows through the media
- Tank liquid level rises
- Flow enters the filter by gravity and filtrate is collected inside the disks and discharged
- Heavier solids settle to the tank bottom

**Backwash Mode**
- Solids are backwashed at a predetermined liquid level or time
- Backwash shoes contact the media directly and solids are removed by vacuum pressure using the backwash pump
- Two disks are backwashed at a time (unless a single disk is utilized)
- Disks rotate slowly
- Filtration is not interrupted
- Backwash water is directed to headworks

**Solids Wasting Mode**
- Heavier solids in the collection hopper are removed on an intermittent basis
- Backwash/Solids Pump provides suction to the solids collection manifold for wasting of settled solids
- Solids are pumped back to the waste handling facilities (thickening, digesters, etc.)

**Floatable Wasting Mode**
- Floatable scum is allowed to collect on the water surface
- After a preset number of backwashes, the water level is allowed to rise above the preset high level
- As the water level increases, floating scum is removed by flowing over the scum removal weir
- Scum wasting water is directed to the plant’s waste handling facility (thickening, digesters, etc.)
AquaDiamond®
CLOTH MEDIA FILTER

Additional Features and Benefits

- Up to eight diamond laterals per unit
- Fits neatly into existing traveling bridge filter profile with minimal civil work
- Variable speed drive platform and backwash pump provide immediate response to influent solids excursions
- Advanced drive and tracking system prevents misalignment

Modes of Operation

Filtration Mode
- Inlet wastewater enters the filter
- Cloth media is completely submerged
- No moving parts
- Solids deposit on outside of cloth media forming a mat as filtrate flows through the media
- Flow enters the filter by gravity and filtrate is collected inside the diamond laterals and discharged
- Heavier solids settle to the basin floor

Backwash Mode
- Periodic backwashing is initiated by increased headloss due to solids deposits
- The platform traverses the length of the cloth media diamond laterals during backwashing
- Backwash shoes contact the media directly and solids are removed by vacuum pressure using the backwash pump
- The platform only operates during backwashing and solids collection

Solids Wasting Mode
- Heavier solids on the tank bottom are removed on an intermittent basis
- Small suction headers collect and discharge settled solids
- The backwash pump is utilized for solids removal

The AquaDiamond® cloth media filter is a unique combination of two proven technologies: traveling bridge and cloth media filters. The result is two to three times the flow capacity of a traveling bridge filter within an equivalent footprint, making it ideal for sand filter retrofits. The unit features all of the same benefits and (3) modes of operation as the AquaDisk but with vertically oriented diamond laterals and a traveling platform.
Building from a decade of experience in applying advanced process control, Filter IntelliPro® is a control system for cloth media filters that uses real time data to optimize chemical usage for phosphorus removal prior to filtration. Among its many features, the system includes automatic optimal dose selection for metal salt, polymer, and pH control.

**System Features**
- PC with IntelliPro software developed by Aqua-Aerobic Systems, Inc.
- Network settings to allow communication between the instruments, the PLC and the PC
- Process, instrumentation and software on-site training

**System Advantages**
- Chemical savings through load based control
- Automatic chemical dose response curves replace jar testing
- Improved process reliability using real time information
- Multi-point analysis of key process parameters

The Aqua MiniDisk® cloth media filter features all of the same benefits and (3) modes of operation as the original AquaDisk. The configurations are designed to provide economical treatment of smaller flows and easily retrofit into existing traveling bridge sand filters.

**Filter IntelliPro®**
**Filtration Optimization System**

The modular design of the Aqua MiniDisk® filter retrofits neatly into existing 9 ft. (2.74 m) wide concrete traveling bridge filter basins, providing more than two times the hydraulic capacity of the original sand filters.
The AquaStorm™ cloth media filter operates on four (4) modes of operation:

- **Filtration Mode**
  - Inlet wastewater enters the filter
  - Cloth media is completely submerged
  - Disks are stationary
  - Solids deposit on outside of cloth media forming a mat as filtrate flows through the media
  - Tank liquid level rises
  - Flow enters the filter by gravity and filtrate is collected inside the disks and discharged
  - Heavier solids settle to the tank bottom

- **Backwash Mode**
  - Solids are backwashed at a predetermined liquid level or time
  - Backwash shoes contact the media directly and solids are removed by vacuum pressure using the backwash pump
  - Two disks are backwashed at a time (unless a single disk is utilized)
  - Disks rotate slowly
  - Filtration is not interrupted
  - Backwash water is directed to headworks

- **Solids Wasting Mode**
  - Heavier solids in the collection hopper are removed on an intermittent basis
  - Backwash/Solids Pump provides suction to the solids collection manifold for wasting of settled solids
  - Solids are pumped back to the waste handling facilities (thickening, digesters, etc.)

- **Floatable Wasting Mode**
  - Floatable scum is allowed to collect on the water surface
  - After a preset number of backwashes, the water level is allowed to rise above the preset high level
  - As the water level increases, floating scum is removed by flowing over the scum removal weir
  - Scum wasting water is directed to the plant’s waste handling facility (thickening, digesters, etc.)

**Additional Features and Benefits**

- Vertically oriented cloth media disks reduce required footprint
- Each disk is lightweight, with removable segments for ease of maintenance
- Effective backwash system that fluidizes cloth fibers to release stored solids
- Specifically designed floatable and solids removal zones
- Use with or without chemical, depending on site-specific water quality requirements
- Can be configured for dual-use application for tertiary or wet weather operation
- Simple start-up and shutdown with unattended operation for remote locations
- Automatic procedure for cleaning and draining the unit for offline storage
- Improves disinfection of wet weather flows

**Modes of Operation**

The AquaStorm™ cloth media filtration system operates on four (4) modes of operation: **Filtration, Backwash, Solids Wasting** and **Floatable Wasting**.
Cloth Media Filtration
Mobile Pilot Systems

Technology pilot demonstrations can be beneficial to wastewater treatment plants by providing a snapshot of essential process operating conditions and allowing the customer to interact with the technology and Aqua-Aerobic personnel. OptiFiber cloth media filter pilot systems provide customers with the most comprehensive on-site testing and analytical services available. Our unique approach is designed to provide prompt operational feedback, allowing immediate fine-tuning of parameters for the most effective pilot/demonstration experience.

Aqua-Aerobic Research & Technology Center

In 2011, Aqua-Aerobic Systems, Inc. in partnership with the Rock River Water Reclamation District (Rockford, IL) built a new Research & Technology Center at the District’s central treatment plant. The facility was constructed for the purpose of conducting applied research and demonstration of new products and processes for treating wastewater. The Center is integral in developing and testing cloth filtration media for future commercialization and application, both domestically and internationally.

OptiFiber® media development: an eight step, three year process

Customers visit the R&T Center as part of the technical seminar program.

All Aqua-Aerobic® cloth media filtration products offer a “green” advantage including lower energy consumption and reduced water usage.
Application Profiles

Municipal Recycle/Reuse
- Hundreds of installations
- Title 22 approved
- Multiple cloths capable of producing effluent below 1.0 NTU

Phosphorus Removal
- Achieve phosphorus removal below 0.075 mg/l
- Depth of filtration means less chemical/flocculation and energy

Traveling Bridge Filter Retrofits
- 2-3 times hydraulic capacity within existing footprint
- Minimal mechanical components and no civil changes

Deep Bed Filter Retrofits
- 3-4 times hydraulic capacity within existing footprint
- Minimal mechanical components and no civil changes

Industrial
- Robust cloth media handles high industrial solids
- Applied in several industrial applications including: Energy, Food/Beverage, Textile and Pharmaceutical

Large Flows
- Ideal application for Aqua MegaDisk® and AquaDiamond® filters
- Smallest footprint when compared to hydraulic capacity
- Experience in large flow filter designs over 50 MGD

Power and Energy
- Removes coal ash and coal fines from runoff or wastewater streams
- Reduces TSS and NTU for process water
- Provides reuse water for cooling

Stormwater/CSO/SSO
- Effectively removes TSS without chemicals
- Easily accommodates varying flows
- Can provide tertiary treatment between rain events

Primary Filtration
- Reduce organic load to secondary process
- Lower energy consumption
- Replace existing primary clarifiers
- Increased biogas production
Providing TOTAL Water Management Solutions

Visit our website at www.aqua-aerobic.com to learn more about Aqua-Aerobic Cloth Media Filtration and our complete line of products and services:

- Aeration & Mixing
- Biological Processes
- Filtration
- Oxidation & Disinfection
- Membranes
- Controls & Monitoring Systems
- Aftermarket Products and Services