Installation Profiles

Retrofits
- 3.0 MGD
- Replaced 108 existing modules with Aqua MultiBore® membranes
- Reduced fouling by 25%
- Improved permeability by 25%
- Surface water treatment for potable use

Reuse
- 1.8 MGD
- Utilizes Aqua MultiBore® C-Series membranes
- Used for concentrated reuse
- Pre-concentration results in high flux
- Multistage wastewater treatment

Drinking Water
- 2.6 MGD
- High recovery rate with zero wastewater discharge
- Utilizes Aqua MultiBore® C-Series membranes
- Groundwater treatment

Drinking Water
- 215 MGD
- Replaced failing trains with Aqua MultiBore® membranes
- Effluent turbidity reduced to <0.03 NTU
- Combined groundwater and surface water treatment

Drinking Water
- 0.1 MGD
- Utilizes Aqua MultiBore® C-Series membranes
- Private Partnership Project (20 yr. O&M)
- Surface water treatment

Pilot Testing
- Complete pilot capabilities
- Ceramic and polymeric membrane systems
- 1.0 gpm flow ranges available
- Skid or trailer mounted units

Membrane Systems
Featuring Aqua MultiBore® Membranes

Providing TOTAL Water Management Solutions

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

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

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For nearly 50 years, Aqua-Aerobic Systems has provided thousands of customers with adaptive treatment solutions in biological processes and filtration for both water and wastewater applications. Our knowledge and expertise in applied engineering and manufacturing allows us to provide highly efficient and cost-effective technologies that require less energy, less maintenance and provide a low cost of ownership over the life of the plant.

Aqua-Aerobic Membrane Systems featuring NO BREAK® Polymeric Membrane Systems

The Aqua MultiBore™ polymeric membrane has been successfully applied in both water and wastewater including high solids applications.

Aqua MultiBore™ P-Series

The Aqua MultiBore™ polymeric membrane has been successfully applied in both water and wastewater including high solids applications.

Polymeric Membrane Features:

- Large diameter bores
- 0.02 µ UF membrane rated for 4 log virus removal
- Each flow is made from one material in a single process
- Inside-outside flow path requires no air scour
- Low fouling: can be cleaned with wide pH range (1-13)
- Superior strength — No fiber break!

Applications:

- Skimmed Water Systems
- Surface Water Treatment
- Well Water Source
- Industrial Water Treatment
- Precedent in Reverse Osmosis Desalination
- Reuse
- Backwash Water Recovery
- tertiary Wastewater Treatment
- New Plants, Retrofit, Expansion

System Advantages:

- No Basic Manifolds
- Less Chemical/Usage
- High Water Recovery Rate
- Low Energy Consumption
- High Permeability
- Compact and Expandable
- No Basins or Filtering Equipment
- Simple Operation and Low Maintenance

Aqua MultiBore™ C-Series

The Aqua MultiBore™ C-Series ceramic membrane has been successfully applied in both water and wastewater applications with more than 140 installed systems from pretreatment to advanced treatment of drinking water.

Ceramic Membrane Features:

- Membranes are constructed with very uniform 0.1 µ pores resulting in high fluxes
- Each ceramic membrane is made from one material in a single process
- Inside-outside flow path
- Resistant to pressure, heat and corrosion
- High mechanical strength — No membrane breaks!
- Low environmental impact — Used membranes can be recycled
- Backwashed with a short blast of filtrate and air, resulting in very high recovery rates

Aqua MultiBore™ C-Series Ceramic Design

Aqua MultiBore™ P-Series Ceramic Design

Filtration Mode:

- During filtration, influent enters the top of each membrane module and flows down through filter bore
- The 0.02 µ pores allow water to pass through to the outside of the fiber but not suspended solids, bacteria, cysts and viruses
- During bottom filtration, influent enters the bottom of each membrane and flows up through the fiber bores
- The system alternates between top and bottom filtration to evenly distribute impurities along the entire fiber length
- In both filtration modes, filtered water flows from the outside of the fiber through the filtrate port on the side of the module

Backwash Mode:

- During both the top and bottom backwash modes, filtered water enters the filtrate port on the side of each membrane module and flows down through the fiber bore
- During top backwash, water flows down through the filter bore, into the bottom of the module and out to clean bottom backwash, water flows up through the fiber bores, into the top of the module and out to clean top backwash
- The system alternates between top and bottom backwash on a cyclic basis, collected at both modules ends can be efficiently flushed out
- Backwash occurs every 20 - 30 minutes, depending on influent quality

Chemically-Enhanced Backwash (CEB) Mode:

- Chemicals are periodically added to the backwash water to dislodge any impurities that were not removed during the backwash modes
- The flow paths are the same as during backwash, very small amount of chemical are added into the filtrate prior to entering the modules
- Coagulant is used to dislodge organic and, if used to dislodge inorganic matter, and chlorine is used for occasional disinfection
- The membranes are soaked in the chemical for 10-20 minutes before being flushed out
- Collected filtrate then aids to clean the membranes through the filtrate port on the side of the module

Airflush Mode:

- Compressed air is injected into the top of the membrane sub-module to remove any remaining impurities that were not removed during the backwash modes
- Airflush typically takes 2-5 seconds at a maximum pressure of 30 psi
- The system is then bled back into normal filtration mode

Aqua MultiBore™ P-Series Typical Installation

Aqua MultiBore™ C-Series Typical Installation

Aqua MultiBore™ Polymers Membrane Installation

Aqua MultiBore™ C-Series Ceramic Design

Aqua MultiBore™ P-Series Ceramic Design

Aqua MultiBore™ Polymeric Membrane Installation

Aqua MultiBore™ C-Series Typical Installation
Aqua-Aerobic® Membrane Systems
Featuring Aqua MultiBore® Membranes

For nearly 50 years, Aqua-Aerobic Systems has provided thousands of customers with adaptive treatment solutions in biological processes and filtration for both water and wastewater applications. Our knowledge and expertise in applied engineering and manufacturing allow us to provide highly efficient and cost-effective technologies that require less energy, less maintenance and provide a low cost of ownership over the life of the plant.

Aqua-Aerobic® Membrane Systems featuring NO BREAK® membranes are available in both polymeric and ceramic options. Each system is designed to effectively remove suspended solids, particulate phosphorus, bacteria, cysts and other harmful impurities, resulting in safe, high quality water.

Every membrane system is designed specifically for the application. The type of membrane used, polymeric or ceramic, is dependent on influent characteristics, treatment objectives and the best economic solution for the plant.

System Advantages
- No Break membranes
- Less Chemical Usage
- High Water Recovery Rate
- Low Energy Consumption
- High Permeability
- Compact and Expandable
- No Basins or Lifting Equipment
- Simple Operation and Low Maintenance

Applications
- Drining Water Systems
- Surface Water Treatment
- Well Water Source
- Industrial Water Treatment
- New Plants, Retrofits, Expansions

Aqua MultiBore® P-Series (Polymeric Membrane Systems)

Polymeric Membrane Features:
- Large diameter bores
- 0.2 µ UF membrane rated for 4 log virus removal
- Each flow is made from one material in a single process
- Inside-outside flow path requires no air scour
- Low fouling, can be cleaned with wide pH range (1-13)
- Superior strength – No fiber breakage

C-Series Typical Installation

Modes of Operation

Filtration Mode:
- During top filtration, influent enters the top of each membrane module and flows down through each fiber bore.
- The 0.2 µ pores allow water to pass through to the outside of the fiber but can be cleaned when needed.
- During bottom filtration, influent enters the bottom of each module and flows up through the fiber bores.
- The system alternates between top and bottom filtration to evenly distribute impurities along the entire fiber length.

Backwash Mode:
- During both the top and bottom backwash modes, filtered water enters the filtrate port on the side of each membrane module and flows into the top of each fiber bore.
- During top backwash, water flows down through the fiber bores, into the bottom of the module and out to drain.
- During bottom backwash, water flows up through the fiber bores, into the top of the module and out to drain.
- The system alternates between top and bottom backwash as foul matter collects at both module ends can be efficiently backwashed out.
- Backwash occurs every 20 - 30 minutes, depending on influent quality.
- A CEF is performed every 8 -18 hours, depending on influent quality.

Chemically-Enhanced Backwash (CEB) Mode:
- Chemicals are periodically added to the backwash water to dissolve any impurities that were not removed during the backwash modes.
- The flow paths are the same as during backwash, very small amounts of chemical are injected into the filtrate prior to entering the module.
- CEB is used to dissolve organics, and is used to dissolve inorganic matter, and chlorine is used for occasional disinfection.
- The membranes are soaked in the chemical for 10 to 20 minutes before being backwashed out.
- A CEF is performed every 8 - 18 hours, depending on influent quality.

C-Series Ceramic Design

Ceramic Membrane Features:
- Membranes are constructed with very uniform 0.1 µ pores ranging in high fluxes.
- Ceramic membranes are made from one material in a single process.
- Inside-outside flow path.
- Rigid and durable – no membranes break.
- Low environmental impact – used membranes can be recycled.
- Backwashed with a short blast of filtrate and air, in less than 30 seconds.

Aqua MultiBore® C-Series

C-Series Ceramic Design

Modes of Operation

Filtration Mode:
- During filtration, influent enters from the bottom of each membrane module and flows up through each ceramic module.
- The C 0.1 µ pores allow water to pass through to the ceramic filtrate collection cells.
- Chemically-enhanced backwash is used between filtration cycles to maintain system efficiency.

Backwash Mode:
- During backwash, filtered water enters the filtrate port on the side of each membrane module and flows into each ceramic module.
- 30 psi filtrate detaches foul matter within the ceramic module.
- Ideal microbes are collected at the bottom of the module and efficiently backwashed out.
- Typical backwash occurs every 4 to 12 hours.

Airflush Mode:
- Compressed air is injected into the top of the membrane module to remove any remaining organics that were not removed during the backwash mode.
- Airflush typically takes 25 seconds at a maximum pressure of 30 psi.
- The system is then placed back into normal filtration mode.
Aqua-Aerobic® Membrane Systems

For nearly 50 years, Aqua-Aerobic Systems has provided thousands of customers with adaptive treatment solutions in biological processes and filtration for both water and wastewater applications. Our knowledge and expertise in applied engineering and manufacturing allows us to provide highly efficient and cost-effective technologies that require less energy, less maintenance and provide a low cost of ownership over the life of the plant.

Aqua-Aerobic® Membrane Systems featuring Aqua MultiBore® Membranes

The Aqua MultiBore® polymeric membrane has been successfully applied in both water and wastewater including high solids applications.

Applications
- Drinking Water Systems
- Surface Water Treatment
- Well Water Source
- Industrial Water Treatment
- Pre-treatment to Reverse Osmosis
- Desalination
- Waste
- Backwash Water Recovery
- Tertiary Wastewater Treatment
- New Plants, Renovations, Expansion

Every membrane system is designed specifically for the application. The type of membrane used, polymeric or ceramic, is dependent on influent qualities such as waste characteristics, treatment objectives and the best economic solution for the plant.

System Advantages
- No Basins
- Less Chemical Usage
- High Water Recovery Rate
- Low Energy Consumption
- High Permeability
- Compact and Expandable
- No Basin or Lift Equipment
- Simple Operation and Low Maintenance

Filtration Mode:
- During filtration, influent enters the top of each membrane module and flows down through each fiber bore.
- The 0.02 µ pores allow water to pass through the membrane while suspended solids, bacteria, cysts and viruses are retained.
- During bottom filtration, influent enters the bottom of each module and flows up through the fiber bores.
- The system alternates between top and bottom filtration to evenly distribute impurities along the entire fiber length.
- In both filtration modes, filtered water flows from the outside of the fibers through the filtrate port on the side of the module.

Backwash Mode:
- During both the top and bottom backwash modes, filtered water enters the filtrate port on the side of each membrane module and flows into each fiber bore.
- During top backwash, water flows down through the fiber bores, into the bottom of the module and out to drain.
- During bottom backwash, water flows up through the fiber bores, into the top of the module and out to drain.
- The system alternates between top and bottom backwash to evenly distribute impurities collected at both module ends can be efficiently backwashed out.
- Backwash occurs every 20 - 30 minutes, depending on influent quality.

Chemically-Enhanced Backwash (CEB) Mode:
- Chemicals are periodically added to the backwash water to dissolve any impurities that were not removed during the backwash modes.
- The flow paths are the same as during backwash, only small amounts of chemical are injected into the filtrate prior to entering the modules.
- Caustic is used to dissolve inorganic matter, and acid is used to dissolve organic matter.
- The backwash water is then rinsed with the ceramic filtrate prior to entering the backwash airflush.
- Airflush typically takes 2-5 seconds at a maximum pressure of 30 psi.
- The system is then placed back into normal filtration mode.

Airflush Mode:
- Compressed air is injected into the top of the membrane sub-module to remove any remaining impurities that were not removed during the backwash modes.
- Airflush typically takes 20 - 30 seconds at a maximum pressure of 30 psi.
- The system is then placed back into normal filtration mode.

AquaMultiBore® P-Series

Polymeric Membrane Features:
- Large diameter bores
- 0.02 µ UF membrane rated for 4 log virus removal
- Each fiber is made from one material in a single process
- Inside-outside flow path requires no air scour
- Low fouling can be cleared with acid pH range (7-13)
- Superior strength – No fiber break!

AquaMultiBore® C-Series

Ceramic Membrane Features:
- Membranes are constructed with very uniform 0.1 µ pores ranging in high fluxes
- Each ceramic membrane is made from one material in a single process
- Inside-outside flow path
- Resistant to pressure, heat and corrosion
- High mechanical strength – No membrane breaks!
- Low environmental impact – used membranes can be recycled
- Backwashed with a short blast of filtrate and air, resulting in very high recovery

Aqua MultiBore® P-Series Polymeric Design

Aqua MultiBore® C-Series Ceramic Design

Aqua MultiBore® C-Series Typical Installation

Aqua MultiBore® C-Series Ceramic Design

CERAMIC MEMBRANES

Aqua MultiBore® C-Series ceramic membrane has been successfully applied in both water and wastewater applications with more than 140 installed systems from pretreatment to advanced treatment of drinking water.
The information contained herein relative to data, dimensions and recommendations as to size, power and assembly are for purpose of estimation only. These values should not be assumed to be universally applicable to specific design problems. Particular designs, installations and plants may call for specific requirements. Consult Aqua-Aerobic Systems, Inc. for exact recommendations or specific needs. Patents Apply.