

WHITE PAPER

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# IMPROVING PROCESS EFFICIENCIES IN ULTRAPURE WATER SYSTEMS

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Optimization strategies  
for a competitive industry



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By the year 2020, the ultrapure water industry is project to reach more than \$7 billion USD.

Demands for pure water are at an all-time high and there is an increasing need to abide by stringent environmental regulations. To stay competitive, it is more important than ever to optimize process efficiencies in order to save production costs and avoid the consequences of downtimes.

This white paper provides information to help educate and inform the reader on best practice methodologies.

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# Delivering a Quality Product

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As consumer product quality and health care regulations continue to tighten, so does the demand for manufacturers to produce a cleaner, higher quality product. As a significant ingredient, power source or cleansing agent in many manufacturing processes, pure and ultrapure water are becoming a substantial part of the equation for success.

The majority of pure and ultrapure water systems must meet strict regulations of industry-specific governing bodies, such as the FDA, EPA, USP, or EU. Each of these organizations set guidelines for the production and usage of pure and ultrapure water within their respective industries. However, regardless of who sets the standard, micro-filtration is always a crucial part of the formula.

With these global challenges, the need for efficient and effective filtration systems has become an essential component to delivering quality product. Depending on the industry, the manufactured product, or the regulating body setting the rules, water quality expectations may vary dramatically from one system to another.

The one constant variable is the presence of micro-filtration technologies. Whether you're looking for basic visual clarity or require something more specific such as 18 meg-ohm resistivity or full microbiological sterility and endotoxin removal, your choice of filter has a direct impact on your ability to optimize your system.





# Filtration Solutions Have a Direct Impact on the Quality of your Products

## Selecting the Best-Suited Media

Several factors must be considered when selecting the best-suited filtration media including the required flow rate, influent quality, and effluent requirements.

One factor to consider is influent quality. There must be adequate coverage of the filtration area, or EFA, in order to capture the bulk of incoming solids. Depending upon the particulate distribution, and ambient conditions, coverage can be accomplished with a depth or pleated depth filter.

After solid removal, the focus shifts to the capabilities of the remaining components of the system and the desired final product water quality. If reverse osmosis, deionization, or carbon system is present, the system must be protected accordingly. This can be accomplished with the use of a high-purity pleated depth product, such as pleated polypropylene or pleated microglass, which optimizes the rating and capacity during this stage.



Additionally, the product water must be polished or filtered with a membrane, to reach the required cleanliness. In general, the polishing filter will utilize a 0.2µm hydrophilic membrane, with or without some form of bacterial retention. Appropriate regulatory agencies or in-house company guidelines will typically provide membrane requirements for your process.

While the general process for producing pure or ultrapure water is similar from one system to the next, each process is unique and requires specific considerations.

## Recognizing Differences in Process & Product

With regard to the multiple variables in each pure and ultrapure water manufacturing process, the various levels and types of filtration solutions must be considered.

Typical applications for pure and ultrapure water include:

### Pure Water

- Mixed Bed Ion Exchange
- Water Conductivity Systems
- Boiler Feed Water

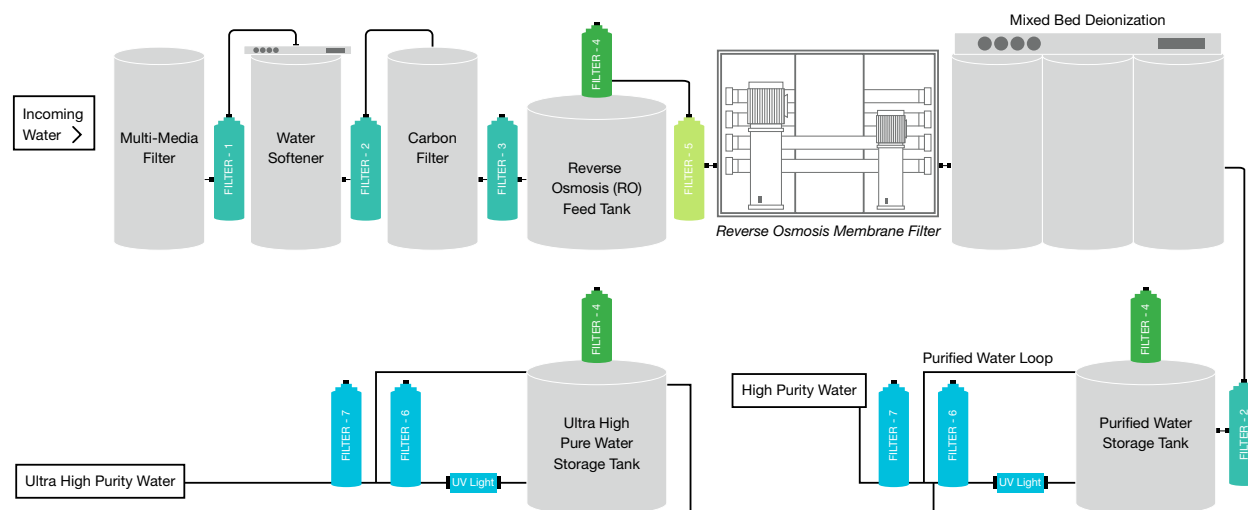
### Ultrapure Water

- Semiconductor Manufacturing
- Water For Injection (WFI)
- Laboratory Grade Water



# Optimizing the High Purity Water Process

Before purchasing a water purification system, it is important to understand the purity process that will optimize the system.



## Sediment, Particulate & Trap Filter Stages: 1, 2, 3

### Pleated Polypropylene

PP, PPE, HFPP Series

### Pleated Microglass

FG, FGE, HFFG Series

### Polypropylene Meltblown

GWTB, GCTB, GATB Series

Protecting the activated carbon, deionization tanks, and the RO or Ion Exchange Units (IEU) is critical. Surface or groundwater is typically treated and softened before filtration with a filter that removes particles larger than 10 microns, then filtered down to one to five microns filter to protect downstream equipment.

## Tank Filter Stages: 4

### PTFE (Hydrophobic) Membrane

GGPTFE Series (General Grade)

EPTFE Series (Electronics Grade)

BRPTFE Series (Bio-burden Reduction grade)

PPTFE Series (Sterilizing Grade)

### Polysulfone (Hydrophobic) Membrane

PSH Series

Storage and fill tank vent filtration allows for bacteria and particulate-free air to pass during filling and evacuation, protecting the storage tank and its contents from contamination. This filter is typically rated at 0.2 micron and is hydrophobic and bacterial retentive, which prevents moisture airborne contaminants from entering the tank.

## Pre-Filtration Filter Stages: 5

### Pleated Polypropylene

PP, PPE, HFPP Series

### Pleated Microglass

FG, FGE, HFFG Series

Removes fine particles and suspended organic matter and serves as pre-filtration to the RO and deionization system. If water has IEU treatment, a 5-micron filter may be installed between the IEU and the water storage tank to prevent fractured beads from entering.

## Bio-Burden/Polishing Filter Stages: 6 & 7

### Polyethersulfone (Hydrophilic) Membrane

GEPEs Series (Electronics Grade)

GFPEs Series (Food & Beverage Grade)

BRPEs Series (Bio-Burden Reduction Grade)

PPES Series (Pharmaceutical Grade)

Reduces and removes virtually microorganisms and contaminants down to 0.2 micron as final filtration to high purity applications and as further polishing in downstream ultra high purity water systems.

# Global Filter Tailors Filtration Solutions To Fit Your Needs.

## SEPARATE YOURSELF FROM YOUR COMPETITION

Global Filter's industry-leading products allow various UHP water applications. Our high-purity pleated depth and membrane filter cartridges lead the industry in quality, performance, and cost-effectiveness. Our customers receive hands-on support in several specialized areas including unparalleled customer service, technically trained staff, efficient customization of products, and stocking agreements.



### Quality Products

Pleated & Depth Cartridges  
Liquid Bag Filters  
Cartridge & Bag Vessels



### Reliability

Reduce Costly Downtime  
Robust Construction  
Cost-Effective



### Fast Delivery

On-Hand Inventory  
Minimal Lead Times  
Easy Access to Products

## FILTER VESSELS





# Filtration Elements by Removal Capability

### **Meltblown Products (>5.0 micron filtration)**

- Water Grade Polypropylene Meltblown Cartridge  
– GWTB
- High Performance Grade Polypropylene Meltblown Cartridge  
– GCTB
- Absolute Grade Polypropylene Meltblown Cartridge  
– GATB

### **Pleated Depth Products (0.2-5.0 micron filtration)**

- Pleated Microglass Filter Cartridge  
– FG
- Pleated Polypropylene Filter Cartridge  
– PP

### **Pleated Membrane Products (< 1.0 micron filtration)**

- Food and Beverage Grade Polyethersulfone  
– GFPES
- GEPES Electronics Grade Polyethersulfone  
– GEPES
- Bio-Burden Reduction Grade Polyethersulfone  
– BRPES
- Pharmaceutical Grade Polyethersulfone  
– PPES
- Bio-Burden Reduction Grade PTFE  
– BRPTFE
- Pharmaceutical Grade PTFE  
– PPTFE

