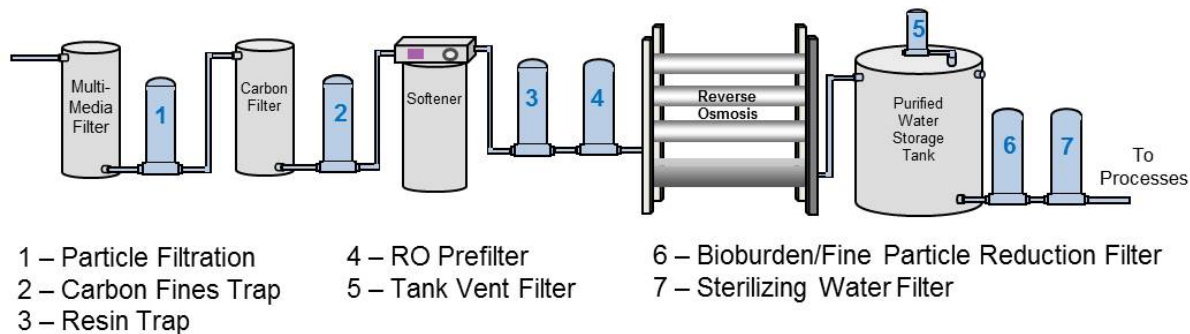**CRITICAL PROCESS**
FILTRATION, INC.

There are many reasons to remove particles 1 micron or larger in water systems. All are related to protecting the system and your processes from contamination by those particles. There are also many potential sources of particulate matter in water systems. Particles could enter with the feed water (municipal or well water). Particles may be shed by some of the system components such as multi-media filters and resin-based treatment components (softeners or deionizers). This document explores the filtration options available to remove these particles and protect your water treatment processes.

Figure 1 - Typical Water System Components

1 – Particle Filtration
2 – Carbon Fines Trap
3 – Resin Trap
4 – RO Prefilter
5 – Tank Vent Filter
6 – Bioburden/Fine Particle Reduction Filter
7 – Sterilizing Water Filter

Removing Particulates from Water

In most cases, the water entering a reverse osmosis (RO) system is filtered to remove larger particles, larger meaning bigger than 1 to 5 microns, depending on the system. Removing these particles prevents premature fouling of the reverse osmosis membranes, which are a critical and expensive component for water treatment.

The quality of the incoming water determines how much filtration is needed to protect the RO membranes. Figure 1 shows the most complete system. Many systems using municipal water will need few of these components. Below is a brief explanation of each particle filter and its function.

Particle Filtration (Housing 1)

Systems using well water or other raw, untreated water often use a multi-media filter (sand filter) before the water enters the treatment system. In most cases, water from municipalities does not require this step. The sand filter could release small particles that should be removed before they reach downstream components and clog them or otherwise interfere with their operation.

Carbon Fines Trap (Housing 2)

The activated carbon filter shown in the diagram is typically a granular carbon filter that removes chlorine, chloramine, and other dissolved organic materials from the water supply. This protects downstream treatment components, particularly RO membranes, from oxidation. Unfortunately, all carbon filters release fine carbon particles, so trap filters are needed to protect downstream equipment.

Smaller systems utilize activated carbon block cartridge filters, such as Critical Process Filtration's ACB Activated Carbon Block cartridges, instead of granular carbon beds. Due to their method of construction, carbon block filters do not shed carbon fines after a short initial rinse, making a downstream filter unnecessary.

Resin Trap (Housing 3)

The resin-based treatment process shown in the system diagram is a water softener. Removing hardness ions (calcium, magnesium, etc) helps prevent premature fouling of RO membranes. The resin beads installed in softeners will break down over time and introduce resin fines into the water supply. Filters are used to trap the fines and prevent them from harming processes downstream.

RO Prefiltration (Housing 4)

The most important particle filter is the RO prefilter. This filter protects the high pressure RO pump and keeps particles from reaching the membranes. Reducing particle loads prevents membrane fouling and membrane performance loss. Longer membrane life means reduced system cleaning and maintenance expenses as well as lower membrane replacement costs over the life of the system.

Figure 2 – Critical Process Filtration Melt-Blown and Nano-Spun Polyproplyene depth filters and pleated depth media filters are available in configurations to fit existing housings.

Filter Options

Depth filtration products such as Critical Process Filtration Melt-Blown Polypropylene or Nano-Spun Polypropylene cartridges are commonly used for particulate removal. These products will hold a large quantity of silt or sediment before requiring replacement. Yarn wound filters are also utilized in this application, but wound filters often add 'extractable' surfactants to the water just after installation. Additionally, the superior construction of Critical Process Filtration's Melt-Blown or Nano-Spun filters ensures consistent particle removal unmatched by yarn wound filters.

Depending on the type and quantity of particles in your water supply, an economical alternative to standard depth filters may pleated media filters. Pleated filtration products, such as pleated polypropylene depth filters, have several times more surface area than melt-blown or nano-spun depth filters and may hold a much higher quantity of sediment or silt. Pleated filters do generally cost more, but the increased life in high-particle-load applications and labor savings from reduced filter change frequency may make pleated filters economically advantageous.

Contact Critical Process Filtration for assistance in determining the best filter options for your system.

Filter Media Options for Particle Filtration in Food & Beverage Process Water Systems

Process Area	Filter Application	Filter Function	Critical Process Media*
Prefiltration	Particle Reduction	Reduce particulate load to protect performance of downstream water treatment processes	MB, NS, PD
	Carbon Fines Removal	Remove carbon fines to protect downstream processes	MB, NS (ACB in small systems)
	Resin Trap	Protect downstream processes from resin fragments that might foul media or membranes	MB, NS
	RO Prefiltration	Remove particulates that might prematurely foul membrane or interfere with membrane performance	MB, NS, PD

*Media Codes
MB = Melt-Blown Polypropylene Depth   NS = Nano-Spun Polypropylene Depth   PD = Pleated Polypropylene Depth
ACB = Activated Carbon Block

Visit our website or contact us for more information and to access data sheets on all of our products.

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