

Controlling Bacteria and Spoilage Organisms in Food & Beverage Process Water

Controlling Bacteria and Spoilage Organisms in Food & Beverage Process Water

Most people don't realize that tap water can contain bacteria, even if the water has been chlorinated. In the vast majority of cases, the bacteria have no ill effect on anyone using the water. However, when that water is used for food processing the bacteria can be of concern. While they may not cause illness, some

bacteria may create off flavors, odors or other characteristics that reduce product quality.

There are many possible configurations of water systems in food & beverage processing facilities. This summary focuses on two that represent a range of possibilities. The first (Figure 1) is a filter system fed by municipal water that may be used to wash and rinse packaging. The second (Figure 2) is a process water purification system that may create water for use as an ingredient.

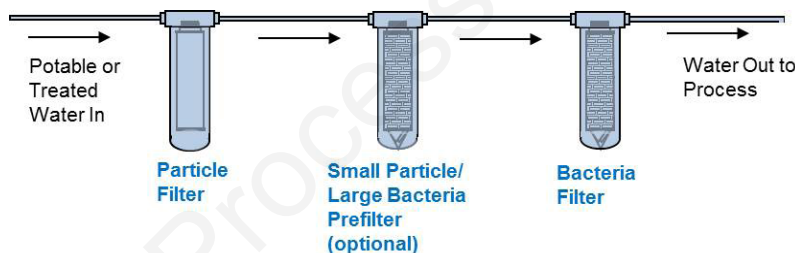


Figure 1: Municipal Water Filtration for Bacteria Control

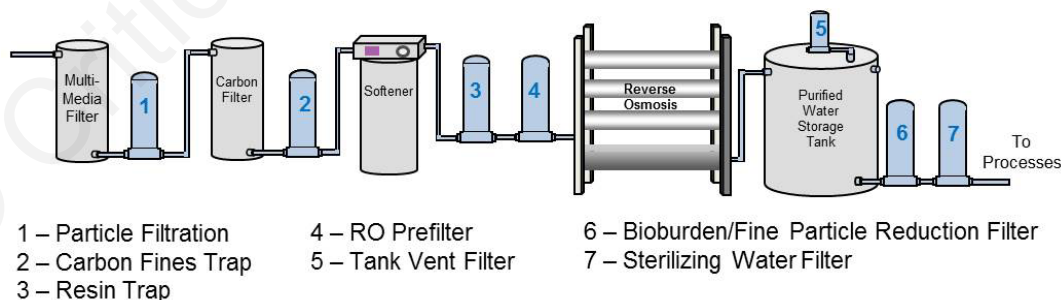


Figure 2: Bacteria Control in a Process Water System

Understanding Bacteria Filters

When a filter is supplied as a “bacteria removal” filter, it is expected to remove all bacteria so that the resulting water is “bacteria-free”. For food & beverage applications, the microorganisms include bacteria like *Lactobacillus*, but also molds like *Aspergillus* and yeasts like *Saccharomyces*. The best filters for bacteria removal are “sterilizing filters” made to pharmaceutical industry standards, usually with pore size ratings of 0.22 microns. That pore size is smaller than bacteria and other spoilage organisms that might be found in a process water system. The filters must be tested and proven to remove all bacteria. Documentation of performance is usually provided in the form of a certificate of compliance in each filter package. That certificate needs to state that the filter has passed standardized tests proving that it will remove bacteria.

Critical Process Filtration supplies both pharmaceutical-grade filters and food & beverage grade filters. Both are tested during production to assure their ability to remove the target organisms for each industry. Both are supplied with certificates showing that they are able to remove bacteria or spoilage organisms.

Removing Bacteria and Spoilage Organisms from Tap Water

In many facilities, the water used for washing and rinsing bottles or other forms of packaging is normal tap water from a municipal source. The amount of particles and bacteria in that water will vary widely based on the original source of the water and the age of the municipal water distribution piping. Filters need to remove particles as small as 0.22 microns to assure that the water is bacteria-free, but there may be a very large number of particles larger than 0.22 microns in the water. The final filter needs to be protected from those larger particles or it will become plugged very quickly. The 3-stage system shown in Figure 1 is used for water with high particle loads so that the bulk of particles are removed by the 2 filters protecting that final filter. If the tap water is cleaner, then one particle filter may be enough to protect the bacteria filter.

Protecting Process Water Quality in a Treatment System

Figure 2 shows a possible configuration for a process water purification system. A common practice is to purify the water with reverse osmosis (RO). Some facilities may also remove more dissolved mineral content through deionization (DI). The water is usually stored in a tank before distribution to points of use in the facility.

As the water is stored and distributed it has no chemical protection against bacteria. If there was chlorine in the source water, it has been removed as part of the purification process. So, any organisms that enter the system after purification will be viable. Waterborne organisms may be distributed to downstream processes and could even form biofilms. Systems are usually subjected to periodic chemical or heat sanitization processes, but bacteria can still enter through open tank vents, open distribution lines, or “dead legs” – unused pipe sections holding stagnant water.

Housings 6 and 7 in Figure 2 are “bioburden reduction” and “sterilizing” filters. The bioburden reduction filter reduces the number of bacteria in the system and lowers the probability of biofilm formation. The sterilizing filter has a smaller pore size and is designed to completely remove bacteria and other spoilage organisms from the purified water.

Tank vent filters (housing 5 in Figure 2) are also critical to preventing bacteria from entering the system. These hydrophobic membrane filters keep airborne bacteria in the environment from entering tanks as they are emptied and contaminating the water.

Filter Options

The filters chosen must be designed to function after whatever disinfection or sterilization process will be used. The organisms targeted for removal also need to be considered.

Critical Process Filtration has several filter options, as shown in the table below. These filters are available as cartridge filters and disposable capsule filters as well as in flat disc form for laboratory scale testing.

Filter Options for Bacteria Removal in Food & Beverage Process Water Systems

Process Area	Filter Application	Filtration Function	Media **
Bioburden Control and Sterilizing	Bioburden Reduction	Remove most bacteria and yeasts	CWPS, PS, PVWL
	Bacteria Removal (Sterilizing)	Remove all bacteria	PS, NM
	Tank Vent Filtration	Prevent bacteria from entering tanks when liquid is drawn from them	TM, PVWB

**Media Codes

CWPS = High Capacity PES Membrane
PVWL = High Capacity Hydrophilic PVDF

NM = Nylon 6,6 Membrane
PVWB = High Capacity Hydrophobic PVDF

PS = Polyethersulfone Membrane
TM = PTFE Membrane



One Chestnut Street
Nashua, NH 03060
603.880.4420
FAX: 603.880.4536

CriticalProcess.com

The information contained herein is subject to change without notice. The Critical Process Filtration logo is a trademark of Critical Process Filtration, Inc. Viton is a trademark of DuPont Performance Elastomers L.L.C.
© 2025 Critical Process Filtration, Inc. • All Rights Reserved

Application Summary • Controlling Bacteria and Spoilage Organisms in Food & Beverage Process Water Rev -