CRITICAL PROCESS FILTRATION, INC.

Filters for Soft Drink Ingredients

Ingredients used in the soft drinks can be from either internal or external sources. Regardless of the source, bottlers treat all ingredients as if they contain some form of contamination that might harm production processes and/or product quality.

The biggest issue with ingredients from outside sources is the unknown nature of the possible contamination. Even if the source of the ingredient has a reputation for quality and consistency, operators should guard against all possible scenarios. That means the possibility of unwanted particles, bacteria or other microorganisms and chemical contamination. While cartridge filters cannot address possible chemical issues, they are a cost effective method of controlling and removing unwanted particles and microorganisms. Assuring that the ingredients entering the bottling process are pure can only help process efficiency and improve product quality.

Filtration Goals

The abbreviated schematic in Figure 1 highlights the filters used for ingredient filtration before the ingredients enter the rest of the mixing and bottling process. These filters are designed to remove particles and microorganisms and also protect the ingredients from environmental contaminants while they are stored in tanks.

There are many possible filter configurations, and the actual filter systems used will depend on the contaminants that are known to occur in specific ingredients. The filters shown perform the basic functions needed to remove contaminants from any soft drink ingredients.

The filters highlighted in Figure 1 perform three functions, particle control (filter 1), microorganism and small particle control (filter 3), and tank contents protection (filter 2).

Filters for Particle Control

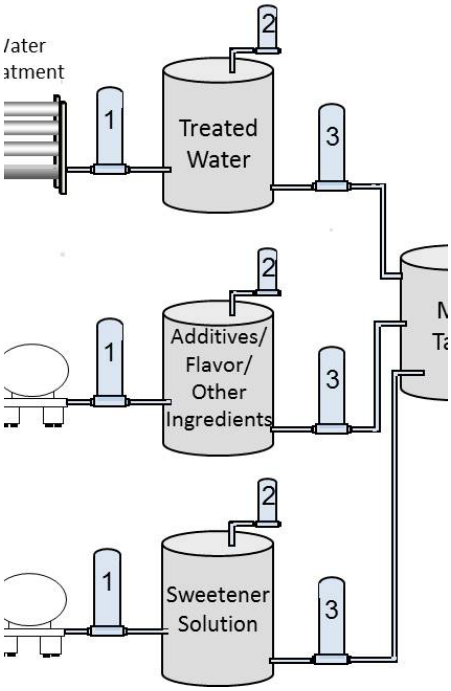
Unwanted particles in any ingredients could be almost any size. Larger particles, those larger than 1 to 5 microns, are easily removed using depth filtration.

Depth media in cartridge filters is found in two forms. The standard depth filter is a self-supporting tube made using a polymer, most often polypropylene. The tube is formed using the melt-blown or nano-spun process.

The other form of depth filter uses pleated flat sheet media, most often made with polypropylene or fiberglass. Polypropylene is the most widely used material for water and chemical filtration, but fiberglass has better filter efficiency and generally allows higher flows and throughput than polypropylene in most applications.

Standard depth filters will capture a range of particle sizes through the thickness of the media. Pleated media filters have the advantage of a large surface area that can hold a higher quantity of particles on that surface than the standard depth filters.

Figure 1 - Soft Drink Ingredient Filters



Filters for Bioburden and Small Particle Control

The next level of filtration for ingredients is removal of smaller particles and some bacteria or other organisms. This process of "bioburden control" is performed by membrane-based filters. The filter performance requirements are determined by the level of particle and microorganism purity required by the rest of the process. If the

Application Summary

process requires only a reduced bioburden load, then a filter with pore size rating of 0.45, 0.65 or even 0.85 microns might be used, based on what is believed to be in the ingredients. However, if a process requires that an ingredient be "bacteria-free", then the filter pore size will probably be 0.22 microns or perhaps even 0.10 microns.

Tank Vent Filters

The tanks used in production systems, even tanks made of stainless steel, are not designed for elevated pressure or vacuum. Either will cause structural bulging or tank implosion. That is why air is allowed to flow into and out of the tank during emptying or filling, to avoid pressurizing the tank or causing a vacuum condition. The air or gas entering the tank is filtered to prevent environmental particles and bacteria from contaminating the liquid inside the tank. Figure 1 on the previous page shows the tank vent filters (filter 2) on the tops of tanks.

Filters used for liquid applications are usually made of materials that attract water – are 'hydrophilic' – and allow the easy flow of liquids through the media or membrane. For air filtration, it is critical that the media remain dry. If the media becomes wet and the pores are filled with liquid, then the required air flow is restricted and the pressure or vacuum inside the tank can reach critical levels and cause tank failure. The various media used for air filters are 'hydrophobic' – they repel water – and resist wetting from water vapor.

As with the bioburden control filters, vent filter performance targets are determined by operating conditions and expected contaminants. Most vent filters are designed to prevent bacteria, molds and wild yeasts from entering the tanks, so the pore sizes are usually 0.22 microns.

Figure 2 – Critical Process Filtration's pleated filters are available in a wide variety of configurations to fit existing housings

Filter Options

The filters chosen must be compatible with the fluid being filtered. The particle sizes and organisms targeted for removal also need to be considered. Finally, assure that the filters are designed to function after whatever disinfection or sterilization process will be used.

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 is in flat disc form for laboratory scale testing.

Contact Critical Process Filtration for help determining the best filter options for you, or visit us at www.criticalprocess.com for more information and to access datasheets with more detailed information on all of our products.

Filter Options for Soft Drink Ingredient Filtration

Process Area	Filter Application	Filter Function	Critical Process Media*
Particle Control	Remove Larger Particles (1 to 5 micron)	Protect downstream processes and filters from fouling by large particles	MB, NS, GD, PD
Bioburden Control	Large Organism Removal	Remove particles and larger organisms like yeasts and molds	GD, PD
	Bioburden Reduction	Remove most bacteria from water or other ingredients	CWPS, PVWL, NC, NM, PS
	Bacteria Removal (Sterilizing)	Remove all bacteria from the stream	PS, NC, NM
Vent Filtration	Particle and Bacteria Removal	Prevent airborne contaminants from reaching tank contents	PVWB, TM

*Media Codes

MB = Melt-Blown Polypropylene Depth Media
NS = Nano-Spun Polypropylene Depth Media
GD = Pleated Fiberglass Depth Media
PD = Pleated Polypropylene Depth Media
CWPS = High Capacity Polyethersulfone (PES) Membrane
NC = Charged Nylon 6,6 Membrane
NM = Nylon 6,6 Membrane
PS = Polyethersulfone Membrane
TM = PTFE Membrane
PVWB = High Capacity Hydrophobic PVDF Membrane
PVWL = High Capacity Hydrophilic PVDF Membrane

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

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