CRITICAL PROCESS FILTRATION, INC.

# Protecting Juice Quality with Clarifying Filters

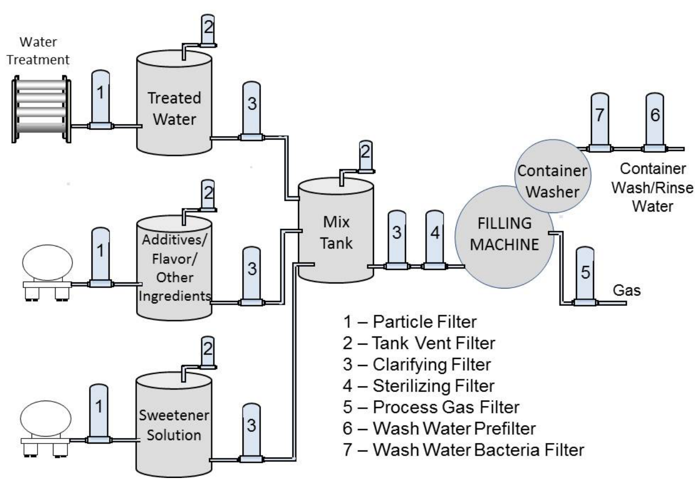
The multiple ingredients for juices arrive from multiple sources for mixing and packaging. Water for both container washing and ingredient mixing is treated in the plant. Flavors, additives and sweeteners may arrive from outside sources.

Figure 1 is a simplified process diagram showing the filtration steps in a juice packaging facility. To the left of the figure are the various ingredients as they arrive in the plant. All may carry larger, visible particles that could adversely affect product quality. The housings marked 1 immediately filter the ingredients to remove these larger particles before the ingredients even reach the storage tanks. The particles, if allowed to settle in the tanks, could form sediment that is difficult to remove in cleaning processes. They could also cause off flavors and aromas and even visible defects in the final product if left in the process.

As the various ingredients are brought into the final mixing and packaging process, clarifying filters (housings marked 3) are used to remove smaller particles and some larger microorganisms and protect the more expensive bacteria removal filters downstream.

Clarification is more than just reducing haze or making the juice visually clear. The particles removed range from small organic debris and undissolved sugar crystals to molds and other microorganisms that may have found their way into the system and might adversely affect quality and shelf life.

**Figure 1 - Filtration in Juice Production**




## Choosing Filters for Clarification

Depth filters are made with media that is melt-blown or spun-bonded into continuous polymer fibers that are formed into either a thick tube or a flat sheet. The most common materials for depth media are polypropylene and fiberglass.

Standard depth filters are made by forming the fibers into tubes with thick walls using the melt-blown process. These types of filters capture particles through the depth of the media. Examples of standard depth filters are shown in Figure 2. The sediment filters (housings marked 1 in Figure 1) are likely be standard depth filters. Polypropylene is the most common material for standard depth filters, though other more expensive materials are sometimes used for specialty applications.

Melt-blown media is more efficient than other types of depth filters, like yarn-wound filters. As the name suggests, yarn-wound filters are made by winding yarn around a core. The yarn can shift and create channels for liquid to flow through without being filtered. Melt-blown filters are continuously bonded fibers in self-supporting tubes that do not require a core. They are generally more efficient and easier to dispose of once used.

Application Summary

Figure 3 shows filters made using flat sheet media made using polypropylene or fiberglass. The flat sheet media is pleated to create more surface area. With the increased surface area, the filters and are capable of capturing and holding a larger quantity of particles. The higher capacity makes pleated depth filters the preferred technology for most clarification filters (housings marked 3 in Figure 1), though some facilities prefer standard depth filters, especially if the particle load is low.

**Figure 2** – Critical Process Filtration standard depth filters

## Choosing Filter Pore Sizes

The size and number of particles in the ingredients determines what filter pore sizes to use and how many filters will be needed. The sediment filtration step could be designed to remove a large number of particles with sizes over 5 microns. This is often the particle size found in sediment. Though individual particles smaller than about 20 microns are not visible to most people, when they either agglomerate or settle to the bottom of a container they become visible. Using 5 micron rated filters as sediment filters will remove most of these particles.

Clarification filters can serve as second particle filters or be chosen as the first filters to remove microorganisms to assure the biological stability of the final product. If the facility chooses to use the clarifying filters only to remove particles and reduce haze, then a 3 or 5 micron pore size rating is sufficient. If the clarification filters should also begin the biological stabilization process, then a 1 micron or 2 micron rated filter will remove most yeasts and molds and some bacteria that may have entered the process.

## Filter Options

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.

The filters chosen must be compatible with whatever disinfection or sterilization process will be used.

Contact Critical Process Filtration for help determining the best filter options for you.

**Figure 3** – Critical Process Filtration's pleated depth filters are available in a wide variety of configurations to fit existing housings

### Filter Options for Juice Clarification

| Process Area | Filter Application | Filtration Function | Critical Process Media* |
|---|---|---|---|
| Clarification | Sediment & Particle Reduction | Protect downstream processes and filters from fouling by large particles | MB, NS, PD, GD |

*Media Codes
GD = Pleated Fiberglass Depth Media
PD = Pleated Polypropylene Depth Media
MB = Melt Blown Polypropylene Depth Media
NS = Nano-Spun Polypropylene Depth Media

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

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