# Filter Options for Chemical Processing

CRITICAL PROCESS FILTRATION, INC.

Removing particle and organic contaminants protects downstream chemical processes, the quality of the final product and your brand reputation.

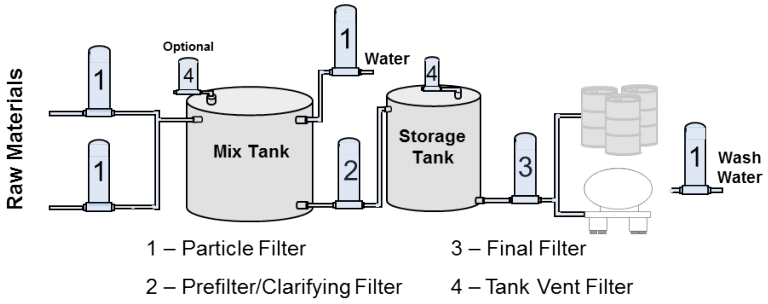
Particles can also affect the efficiency of your system. Particle filtration is usually performed early in the process, though it may also be required if a processing step creates particles.

Clarification is usually performed later in the process before preparation of the product for final filtration and packaging.

The schematic below show the possible locations of filters in a simplified chemical process. A common first step in filtration is assuring that raw ingredients, including process water and container wash water, do not contribute particles to the process. Another common step is particle filtration and/or clarification after the mixer/reactor. Though only one filter housing is shown performing clarification in the schematic, multiple filters may be needed based on quantity and size distribution of those particles.

Final filtration can vary from removing visible particles to removing sub-micron sized particles and bacteria. The filter chosen are dictated by the product requirements.

**Figure 1 - Filtration in Chemical Processing**




## Large Particle Removal

Removing large particles is often done as ingredients enter the process (housings marked "1"). This first filtration step removes large particles that could interfere with mixing and formulation processes. Standard depth filters are usually the most economical alternative for filtration at this stage. Standard depth filters are a self-supporting tube of fibers, usually made using polypropylene but also available in nylon. This type of filter captures particles in a wide range of sizes throughout the depth of the media. Filters with a pore size rating of 3 or 5 microns are most often used to capture larger particles.

## Prefiltration and Clarification

Filters remove particles that are either inorganic or organic (like bacteria). For clarification, filters capture smaller particles that can cause visible haze or cloudiness in chemicals. Improving the visible characteristics of your product may be perceived as improved purity by end users, meaning improved quality and, perhaps, improved value. This simple filtration procedure may be critical to product acceptance by customers.

Unwanted particles can be introduced to the process or even created as part of the process. Adding solid ingredients during formulation may result in undissolved particles. Particles can also be created by chemical reactions during the production process or from normal wear and tear on system components such as pumps and valves. The housing marked "2" represents this prefiltration and clarification step. It may be placed in this location or just before the "final" filter (marked "3").

The media and micron rating of the prefilter is chosen based on the particle load and size of the particles to be removed at that stage of production. For particles larger than 1 micron, depth media filter with a 1 micron or slightly smaller pore size rating is often used. Smaller particles may be removed using pleated depth filters or membrane media.

## Final Filtration

The housing marked "3" is the final filter. The schematic shows a single filter. However, if the particle load is high, the final filter may be protected by another prefilter with a slightly larger pore size rating.

The media and micron rating of the final filter are chosen based on the particle load of the chemical and the size of the particles to be removed. If the product specification requires particles larger than 1 micron to be removed, but allows particles smaller than 1 micron, then a depth media with a 1 micron or slightly smaller pore size rating is usually chosen. Chemicals requiring sub-micron size particles to be removed usually use membrane media with the pore size chosen based on the largest allowable particle.

## Filter Options for Chemical Processing

| Process Area | Filter Application | Filtration Function | Grade* | Media** |
|---|---|---|---|---|
| Raw Materials Filtration | Large Particle Removal | Protect downstream processes and filters from fouling by particles larger than 3 to 5 microns | G | MB, NS, NMMB |
| Mixers, Reactors | Prefiltration | Remove particles smaller than 3 microns and larger than those to be removed by the final filter | G | MB, NS, NMMB, PD, GF |
| Packaging | Final Filtration | Remove all particles larger than the maximum particle size allowed by the product specification | G | CWPS, NM, PVWL, PS, TM |

*Grade Codes
G = General Service Grade

**Media Codes
GD = Pleated Fiberglass Depth Media
NMMB = Melt Blown Nylon Depth Media
NM = Nylon 6,6 Membrane
TM = PTFE Membrane
MB = Melt Blown Polypropylene Depth Media
PD = Pleated Polypropylene Depth Media
PS = Polyethersulfone Membrane
NS = Nano-Spun Polypropylene Depth Media
CWPS = High Capacity PES Membrane
PVWL = High Capacity Hydrophilic PVDF Membrane

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

## Ordering Information

Cartridge order numbers have several variables from grade to media and pore size to end cap type. For example, Food & Beverage Grade, Polyethersulfone Membrane, 0.22 Micron Rating, with SS Support Ring, 20" Length, Silicone O-Rings, 2-226 O-Ring/Spear End Cap Configuration = FPS-20S00002S9.

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**Filter Grade**
G = Service
blank = Melt Blown or Nano-Spun

**316 SS Ring**
N = No Ring

**Membrane/Depth Media**
CWPS = High Capacity PES
NM = Nylon 6,6
PS = PES
PVWL = Hydrophilic High Capacity PVDF
TM = PTFE Membrane
GD = Pleated Fiberglass
PD = Pleated Polypropylene
GDMB = Melt-Blown Polypropylene
NSPD = Nano-Spun Polypropylene
NMMB = Melt Blown Nylon

**Pore Size Code**

| | |
|---|---|
| -03 = 0.03 µm | 5-0 = 5.0 µm |
| -10 = 0.10 µm | 10- = 10 µm |
| -20 = 0.22 µm | 20- = 20 µm |
| -40 = 0.45 µm | 30- = 30 µm |
| -60 = 0.65 µm | 40- = 40 µm |
| -80 = 0.80 µm | 50- = 50 µm |
| 1-0 = 1.0 µm | 60- = 60 µm |
| 1-2 = 1.2 µm | 75- = 75 µm |
| 2-0 = 2.0 µm | 999 = 100 µm |
| 3-0 = 3.0 µm | |

**Cartridge Length Code**
05 = 4.875 in. (12.4 cm)
97 = 9.75 in. (24.8 cm)
01 = 10 in. (25.4 cm)
19 = 19.5 in. (49.5 cm)
02 = 20 in. (50.8 cm)
29 = 29.25 in. (74.3 cm)
03 = 30 in. (76.2 cm)
04 = 40 in. (101.6 cm)

**O-ring/Gasket Code**
S = Silicone
B = Buna
V = Viton (or FKM)
T = FEP Encapsulated Viton (or FKM)
E = EP
R = FEP Encapsulated Silicone

**End Cap Code**
0 = Flat Gasket, DOE
1 = Flat Gasket/Plug
2 = 2-222 O-ring/Plug
3 = 213/119 Internal O-ring DOE
4 = 213/119 Internal O-ring/Plug
5 = 2-222 O-ring/Flat
6 = 2-226 O-ring/Flat
7 = 020 O-ring/Plug
8 = 2-222 O-ring/Spear
9 = 2-226 O-ring/Spear
21 = 2-223 O-ring/Flat
22 = 2-223 O-ring/Spear
23 = 2-222 O-ring 3 Tab/Flat
24 = 2-222 O-ring 3 Tab/Spear
25 = Short 2-222/Plug

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

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