

Filter Options for Ink Jet Ink Production



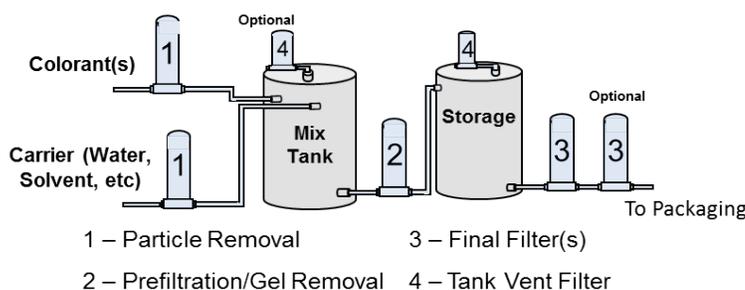
For ink jet printing processes to work properly unwanted particles must be removed from the ink. Particles can take any number of forms from solids to agglomerated particles to gels. All particles have the potential to clog ink jet print head openings and cause print defects. Particle sizes can range from visible (usually larger than 40 microns) to sub-micron sized. Removing them is usually done in stages, with larger particles removed first, then progressively smaller particles removed until the ink is free of contaminants that can affect performance.

Filters to remove large particles (particles larger than 5 microns) are first in the filter chain. Prefiltration steps are defined as those removing particles larger than those targeted by the final filtration step, but smaller than 5 microns. At the end of the filter chain are the "final" filters, those designed and chosen to remove the smallest unwanted particles.

Multiple filtration steps are used so as not to overload any single step. The filters can be located anywhere in the process, but are usually found at the introduction of ingredients, at intermediate stages of mixing/formulation, and again just before packaging.



Figure 1 - Filtration in Ink Jet Ink Production



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. The depth filters capture particles in a wide range of sizes throughout the depth of the media. Depth filters with a pore size rating of 3 or 5 microns are most often used to capture larger particles.

Prefiltration and Final Filtration

Unwanted particles can be introduced to the process with ingredients from outside sources or even created as part of the process. Adding solid ingredients during formulation may result in undissolved particles. Impurities can also be carried downstream and through the process. Particles can also be created by chemical reactions used in the production process or from normal wear and tear on system components such as pumps and valves. The housing marked "3" is the final filter. That filter is often protected by a prefilter (marked "2") with a larger pore size rating.

The media and micron rating of the final filter and prefilter are chosen based on the particle load of the ink and the size of the particles to be removed. If an ink 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 used. Inks requiring sub-micron size particles to be removed usually use membrane media with the pore size chosen based on the largest allowable particle.

Considerations for Pigmented Inks

The final filtration step in the simplified system shown in the figure has more than one filter. This is often the case for inks with very high particle loads, like pigmented inks. The biggest challenge in final filtration of pigmented inks is removing large particles while allowing most of the small particles to pass through the filters and remain evenly dispersed throughout the product. Depth filtration is the most often used technology, but selection of the specific filters is critical. The filtration results depend upon grind, dispersive agents and the specific filters used. It is important to note that different grinding systems can dramatically affect filter performance, and may result in excessive filter use and lower "small particle" yield. Contact Critical Process Filtration for assistance in evaluating filters for pigmented ink formulations.

Filter Options for Ink Jet In Production

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

***Grade Codes**

G = General Service Grade

****Media Codes**

GD = Pleated Fiberglass Depth Media

NMMB = Melt Blown Nylon Depth Media

NM = Nylon 6,6 Membrane

MB = Melt Blown Polypropylene Depth Media

PD = Pleated Polypropylene Depth Media

PS = Polyethersulfone Membrane

NS = Nano-Spun Polypropylene Depth Media

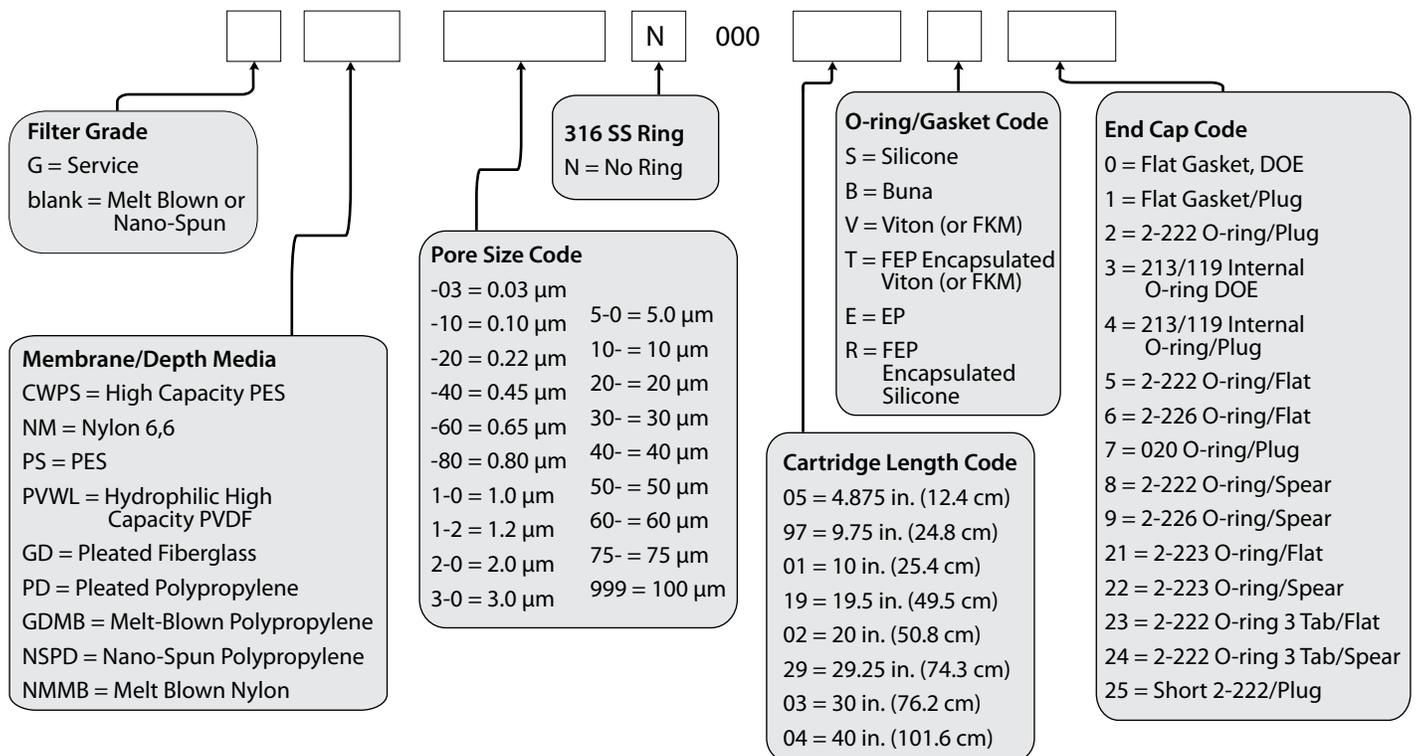
CWPS = High Capacity PES Membrane

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.



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



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