



Pall Corporation

# Filtration Selection Guide for Digital Printing Systems



Filtration. Separation. Solution.<sup>SM</sup>



# Filtration Selection Guide for Digital Printing Systems

## Filtration Solutions for Optimal Ink Jet Performance

**Pall has designed specific filtration technologies for digital printing systems with performance and output quality in mind.**

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The use of digital printing systems that employ ink jet technology has increased significantly in recent years. With the growing reliance on digital printers, performance and printhead longevity have become paramount. A good printer performs dependably, produces quality output, and requires minimal maintenance—all of which are achievable when proper filtration is selected.

Choosing the right filtration for your system can be difficult. That's where we can help. Pall scientists, technical specialists, and sales staff are highly knowledgeable about the inks, chemistries, applications, and cleanliness required for digital printing. Our team works with yours to select filtration that ensures efficient system performance and excellent results.



## Why Pall?

Established more than 60 years ago, Pall Corporation has grown to be the largest and most diverse filtration, separations, and purification company in the world. Our global presence is far-reaching, and our product portfolio and technical expertise are extensive.

Pall offers a variety of products and services to help you position yourself at the top of your industry. Our staff scientists and engineers provide services and conduct research and development, with intensive, broad-based assistance from Pall's worldwide technical support network. Our experts work directly with you to determine how Pall products and technologies can benefit your process. As part of your customized Total Fluid Management<sup>SM</sup> solution, Pall products and services are recommended to streamline your operations and help you gain an edge in this increasingly competitive marketplace.

## What is Total Fluid Management<sup>SM</sup> ?

The Pall Total Fluid Management (TFM) program involves the deployment of fully integrated scientific and engineering services, along with filtration and separation products and systems, throughout your process according to a customized plan. Through TFM, you can reach the highest level of efficiency at the lowest cost. The Pall TFM program consists of a wide range of filtration products, advanced technologies, and services to improve system operation and increase productivity.



# Filtration Selection Guide for Digital Printing Systems

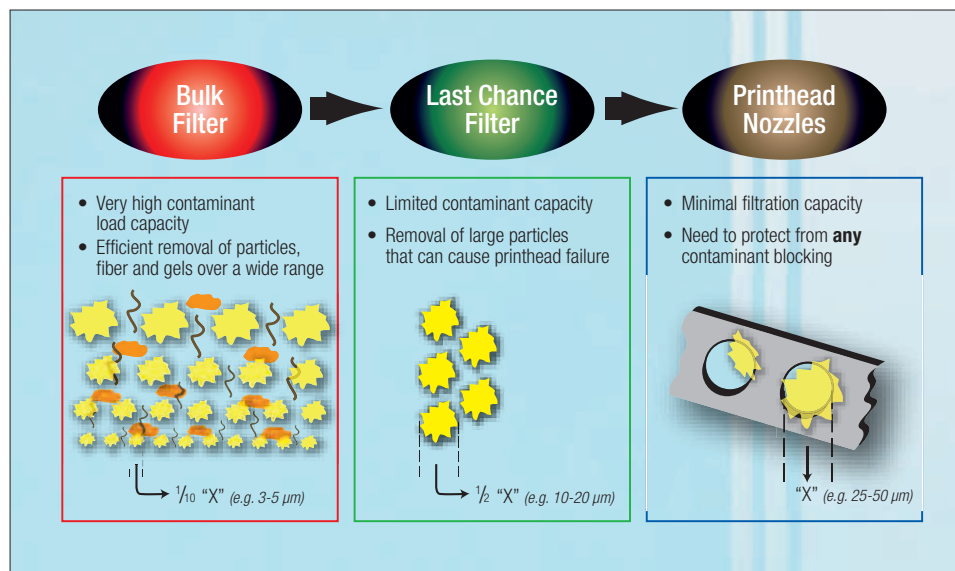
## Considerations When Selecting Filtration

Filtration is essential to ink jet printing and is key in the design of fluid delivery systems. This guide contains the necessary information to select optimal filtration technology and products. Use it as a resource during system development to ensure optimal printer performance down the road.

### Effective dual-filter strategy

Although most ink jet inks are filtered well during formulation, filtration on-board a digital printer is necessary to capture any degradation byproducts, environmental contaminants, and residual printer component debris. The objective is to achieve optimal speed and quality of printer output over the long term.

Filtration on-board a printer is most effective when two filters are used: a bulk filter followed by a last chance filter. The bulk filter has the capacity for high flow and retaining contaminants, and is commonly a self-contained, disposable capsule filter. The last chance filter is positioned very close to the ink jet printhead for point-of-use filtration. Its purpose is to protect the printhead from contamination by debris, which can cause catastrophic failure.



Role of filter types on board an ink jet printer

### Filter requirements

When evaluating a filter, consider these basic requirements.

- **Flow rate.** Higher flow rates necessitate larger effective filter areas (EFA). Refer to the product information on page 8 when selecting a capsule to best accommodate your flow rate.
- **Long service life.** A service life of at least three months is necessary. The high dirt-holding capacity of depth and pleated-depth filters extends service life, making them the best choices for filtering digital inks.
- **Long-term chemical compatibility.** The filter should be able to withstand exposure to the ink chemistry over time; media and capsule compatibility pressure boundary should remain intact.
- **Pressure, temperature, and maximum exposure time.** A filter capsule is a pressure vessel. It is important to take this into account when considering requirements for pressure, temperature, and maximum exposure time. Pressure and temperature, including any hydraulic or thermal cycling, must be well understood in order to select a filter capsule that is reliable and safe under the specified operating conditions.
- **Serviceability.** The type and orientation of the connections should facilitate quick filter changes with minimal mess.



Depth media

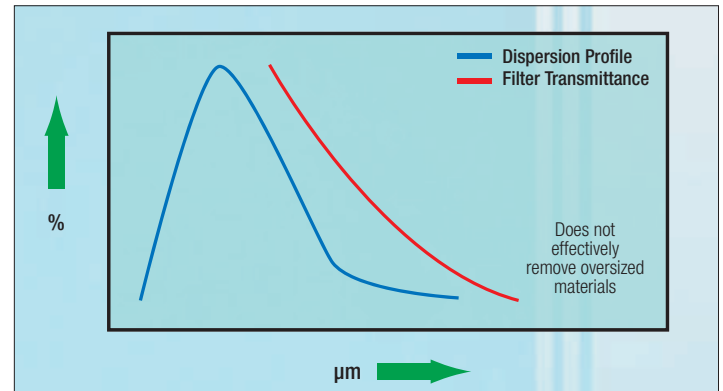
Hybrid media

Pleated media

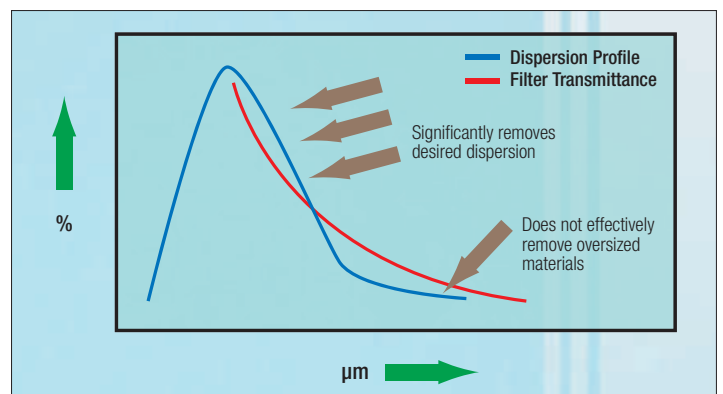
## Media characteristics

To select the appropriate media, check for the following features.

- **Beta-rated.** Beta-rated media provide higher removal efficiency and perform more consistently than nominally rated media. They have repeatable performance, which is ensured during manufacturing.
- **Depth structure.** Depth media and pleated-depth hybrid media generally have the most effective combination of cost savings, extended service life, and removal efficiency.
- **Fixed-pore media.** The media should be verified as nonshedding. Media migration can be catastrophic for an ink jet printhead.
- **Gel retention.** The media must be able to capture and retain gelatinous contaminants. This is a mandatory capability when using UV curable inks. Depth and hybrid media are preferred to ensure gel retention.
- **High flow capacity.** The ability of the filter media to handle high flow conditions is critical, especially in the case of solvent purge and high-speed printing.
- **Low pressure loss.** In the LCF application, low pressure loss is critical to prevent ink starvation and ensure proper printhead operation.
- **Particle morphology.** The morphology of various dispersion or colorant particles of similar chemistries is not necessarily the same. The media should be tested and evaluated for its long-term efficiency and service life with each dispersion or colorant type.



Media is too coarse

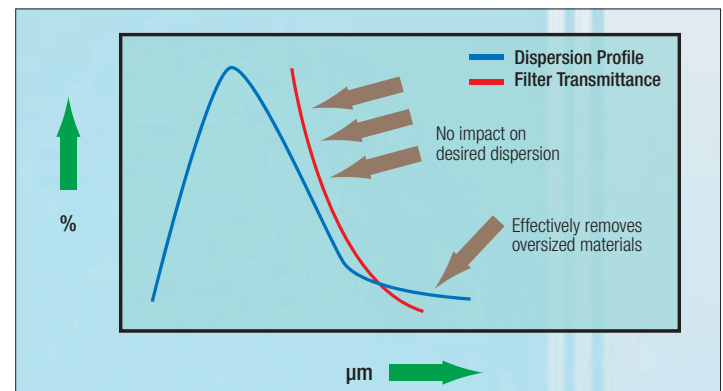


Efficiency range is too broad

## Relationship of dispersion profile to filter transmittance

The relationship of the ink dispersion profile to the filter transmittance is important in media selection. Filter media that is too coarse or that has an efficiency range that is too broad should not be used.

The graphs to the right illustrate the relationship of the dispersion profile and the filter transmittance for the following three conditions: media is too coarse, media has an efficiency range that is too broad, and media is optimal.



Media is optimal

# Filtration Selection Guide for Digital Printing Systems

## Filtration for Typical Ink Delivery System

### Pall Bulk Filter Options



Multiple Application Capsule

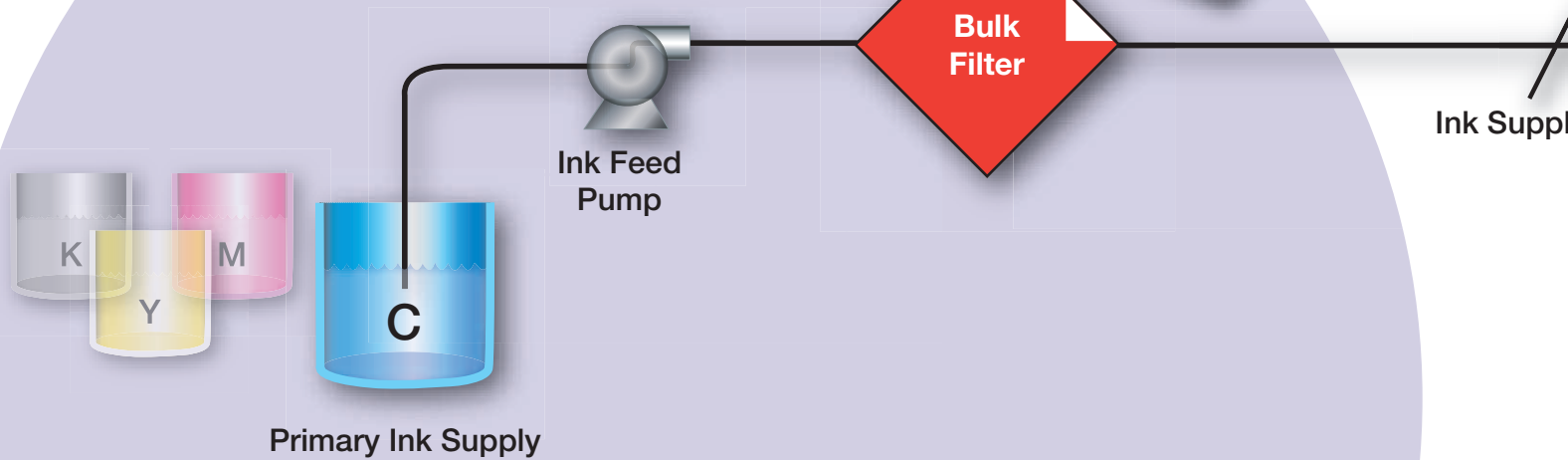


Small Capsule Filter



Acro<sup>®</sup> 50 Filter

### Ink Delivery System



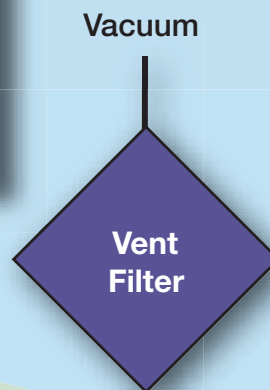
# Pall Last Chance Filter Options



Last Chance Filter



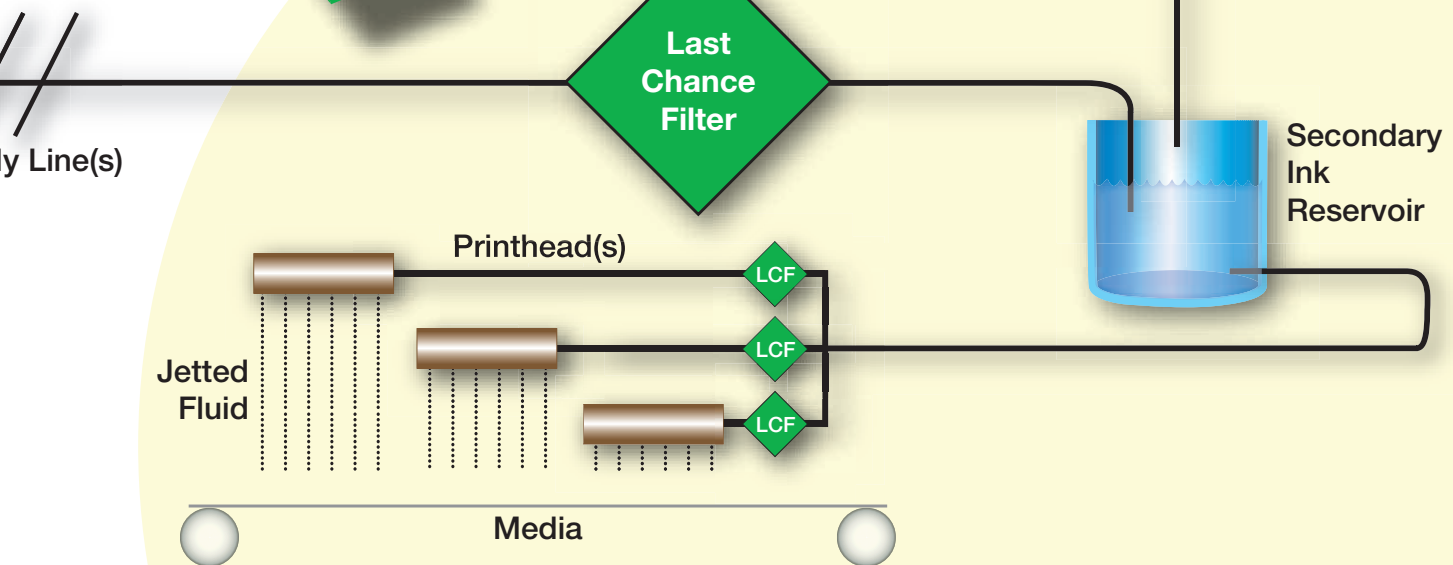
Vent Filter



Vacuum

Vent Filter

## Printhead Carriage Assembly



# Filtration Selection Guide for Digital Printing Systems

## Ink Jet Filtration Products

With a wide range of Pall filtration products for digital printers, we can support many digital printing platforms and meet your requirements for flow, particle removal, and printhead life. Whether you use a wide format printer, super-wide format printer, digital printing press, or unique printing platform, Pall has a filter capsule that can provide you with exceptional printer performance and printhead longevity.

### Capsules for bulk filter application

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Pall filter capsules—the Multiple Application Capsule (MAC) and the Small Capsule Filter (SCF)—are high performance assemblies designed with special features that enable their use with digital printers.

#### Multiple Application Capsule



*Pall Multiple Application Capsule (MAC)*

The MAC assembly provides a high level of printhead protection and long service life in ink jet applications.

Features of the MAC filter capsule include the following.

- Flexibility: wide range of filter media and connectors support various printing platforms and requirements.
- Robust construction: thick walls and integrally molded connectors increase durability.
- Opaque capsule (option): prevents UV light intrusion and ink curing.
- Dual filter design (available in pleated models): last chance filter core guarantees maximum cleanliness without pressure loss.

*Note: For technical specifications, refer to Pall data sheet IJ-1777B (online at [www.pall.com](http://www.pall.com)).*

#### Small Capsule Filter



*Pall Small Capsule Filter (SCF)*

The SCF assembly is ideal for printers where space is limited and high flow rates are required.

Features of the SCF filter capsule include the following.

- Compact capsule: minimizes ink waste and hold-up volume.
- High-area pleated construction: accommodates high flow rates and increases service life.
- Opaque capsule (option): prevents UV light intrusion and ink curing.
- Luer lock compatible connections: facilitate quick and easy filter changes.

*Note: For technical specifications, refer to Pall data sheet IJ-1768 (online at [www.pall.com](http://www.pall.com)).*



## Last chance filters

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The Pall line of last chance filters (LCF)—the Acro filter series—was developed specifically for the ink jet printer. All media has been optimized for ink jet inks. Acro filters are available in three models—the Acro 25 filter, the Acro 37 filter, and the Acro 50 filter. They vary in size to accommodate a wide range of flow rates. These filters provide point-of-use filtration to prevent catastrophic printhead failure in digital printing applications. In larger ink jet printing systems, they can be integrated with Pall's large filter capsules; in smaller printing systems, they can be used as stand-alone filters.

### Acro 25 filter



*Pall Acro 25 Filter*

- Pall HDC® II polypropylene media: provides excellent dirt-holding capacity and low pressure drops for long service life.
- Opaque polypropylene filter housing: prevents UV light intrusion and ink curing.
- Luer lock compatible connectors on inlet and outlet: enable fast filter changes and secure connections.
- Low internal hold-up volume: allows for rapid ink system priming.

### Acro 37 filter



*Pall Acro 37 Filter*

- HDC II polypropylene and Rigimesh® stainless steel media options: allow for maximum flow capacity and excellent chemical compatibility.
- Media grade, connector, and housing color options: offer flexibility.
- Compatible with a wide range of ink chemistries: filter can be implemented across an entire printer family.
- Mid-size filter: accommodates higher flow rates than the Acro 25 filter, yet has a compact design.

### Acro 50 filter



*Pall Acro 50 Filter*

- Very large effective filter area (nearly 20 cm<sup>2</sup>) in a compact assembly: accommodates a wide range of flow rates.
- HDC II polypropylene media in ratings of 6 µm, 10 µm, and 20 µm: maximizes printhead protection without colorant removal.
- Natural polypropylene filter housing: minimizes chemical extractables that can impact ink performance.
- One-quarter inch compression fittings: provide for clean, quick connections with minimal mess.

*Note: For technical specifications, refer to Pall data sheet IJ-1796 (online at [www.pall.com](http://www.pall.com)).*

# Filtration Selection Guide for Digital Printing Systems

## Other Products for Ink Jet Ink Filtration

The most commonly used filters for ink jet ink filtration fall into the following general categories. Specific products are described in the table below.

- **High-efficiency depth filters.** Cost-effective filters for pigmented ink jet ink classification and general filtration applications.
- **Membrane filters.** High-efficiency filters optimized for submicron filtration of dye-based ink jet inks.
- **Traditional pleated filters.** Two types of beta-rated pleated filters for fine filtration of ink jet inks down to 0.1 µm.
- **Hybrid filters.** Filters that combine the high flow capabilities of pleated filters with the gel-removal performance of depth filters.



Laboratory test filters



Filter cartridges for ink formulation



Pall Low Volume Test Filter Housing

### Type of Product

### Characteristics

Type of Product	Characteristics
<b>High-efficiency depth filters</b>	
Nexis® filters	<ul style="list-style-type: none"> <li>• Robust, with outstanding structural integrity and excellent resistance to contaminant unloading.</li> <li>• Available in high-efficiency removal ratings from 0.5 µm up to 120 µm.</li> </ul>
Profile® II filters	<ul style="list-style-type: none"> <li>• Continuously tapered pore construction for long service life.</li> <li>• Available in high-efficiency removal ratings down to 0.3 µm.</li> </ul>
<b>Membrane filters</b>	
Ultipor® N66 filters	<ul style="list-style-type: none"> <li>• Naturally hydrophilic nylon membrane for exceptional solvent compatibility.</li> <li>• Available in high-efficiency removal ratings from 0.1 µm up to 0.45 µm.</li> </ul>
Water-Fine filters	<ul style="list-style-type: none"> <li>• Highly asymmetric polysulfone membrane for superior flow rates and long service life.</li> <li>• Available in high-efficiency removal ratings down to 0.1 µm.</li> </ul>
<b>Traditional pleated filters</b>	
Poly-Fine® II filters	<ul style="list-style-type: none"> <li>• Constructed of traditional melt-blown polypropylene media.</li> <li>• Available in a wide range of removal ratings.</li> </ul>
Ultipor® GF Plus media	<ul style="list-style-type: none"> <li>• Resin-bonded inorganic microfiber media for excellent chemical compatibility.</li> <li>• Available in high-efficiency removal ratings down to 0.1 µm.</li> </ul>
<b>Hybrid filters</b>	
Poly-Fine XLD filters	<ul style="list-style-type: none"> <li>• Distinctive pleat structure optimized for dispersion filtration.</li> <li>• Available in a wide range of high-efficiency removal ratings from 1.5 µm up to 90 µm.</li> </ul>
Profile® Star filters	<ul style="list-style-type: none"> <li>• Unique pleated-depth design for exceptional dirt-holding capacity.</li> <li>• High void volume media for effective gel capture and retention.</li> </ul>
<b>Pall Low Volume Test Filter Housing</b>	<ul style="list-style-type: none"> <li>• Stainless steel with electropolished finish for easy cleaning.</li> <li>• Compact size facilitates optimization testing and minimizes fluid loss.</li> </ul>

Note: All Pall ink jet ink formulation filters are available in test filter size.

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## **Products and Services for All Your Filtration Needs**

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Our ability to meet the filtration needs of the graphic arts industry does not end with ink formulation and digital printing. Pall is a key supplier of innovative filtration products and services for all graphic arts applications. Whether you're manufacturing photographic film, photosensitive plates, or traditional inks, we'll provide the technical expertise, high performance products, and outstanding service you need to support your business.



## Pall Corporation

For more information about our products and services, please contact the Pall Ink Jet Team representative for your region, or email us at [inkjet@pall.com](mailto:inkjet@pall.com).

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