POLYMER SEGMENT FILTERS FOR THE MANUFACTURE
OF HIGH PERFORMANCE FIBERS, FILMS, AND RESINS
POLYMER SEGMENT FILTERS FOR THE MANUFACTURE OF HIGH PERFORMANCE FIBERS, FILMS, AND RESINS

Production costs continue to rise as competition gets tougher and your bottom line gets tighter. Like any successful business, you need to cut costs while increasing efficiency and decreasing the amount of costly product contamination. It’s more than just delivering a product -- real solutions mean matching the right product with the right application.

Pall Corporation has real-world solutions that meet the filtration challenges faced by manufacturers of high-performance fibers, films, and resins. Whether you’re looking to lower production costs or increase plant capacity, Pall can deliver the products and expertise to help your company operate at peak performance.

WHY PALL?

Pall Corporation has been providing leading-edge, process-enabling solutions for the plastics industry for more than half a century. Through innovation and experience, we’ve evolved into the largest and most diverse filtration, separation, and purification company in the world. Our acquisition of Fluid Dynamics and its industry-recognized porous metal technology has further enhanced the wide range of solutions we can offer our customers.

Today our polymer element and system design technology, combined with our metal fiber and media manufacturing expertise, enables us to deliver a broad array of polymer segment elements at different price and performance points. The result is a client-focused approach that lets us help you meet your business needs with a range of solution choices designed to deliver greater value.

Let Pall’s family of polymer segment filters make your film, fiber, and resin operations more cost effective.
PALL’S ADVANCED TECHNOLOGY

Pall uses five advanced types of media to make its family of polymer segments – DYNALLOY®, PMF®, PSS® PMM®, and DYNAMESH® sintered metal media. The mechanical properties of each of these media are uniquely engineered for their specific role in the segment filter.

**Dynalloy Filter Medium**

Superior performance starts with the creation of the metal fiber. In Pall’s proprietary manufacturing process, metal fibers begin as wire drawn from stainless steel and other metal alloys. These microscopic filaments, as much as 30 times finer than a human hair, offer polymer segment filter designers a unique set of properties and benefits.

The fibers in Pall’s Dynalloy media are sinter-bonded to form a durable, porous structure containing no binders. This depth media is extremely effective in removing hard and deformable gel-type contaminants. It provides a high dirt-holding capacity and can withstand temperatures as high as 1200°F / 649°C and pressures up to 3,000 psid / 207 bar d without sacrificing filtration properties.

**Dynamesh Filter Medium**

Dynamesh is our precision woven wire cloth, surface-type filter media, specially suited for applications with adverse pressure conditions and low contaminant loading. It’s available in a variety of weaves and stainless steels ranging from 5µm to 400µ.
HIGH DIRT CAPACITY, LONG SERVICE LIFE

PMF Filter Medium

Pall’s proprietary method of creating the PMF porous metal fiber filter medium results in a highly uniform structure (see Figure 2).

Pall vs. Competition

Shown is the highly uniform structure of Pall PMF metal fiber medium (Figure 2) vs. conventional fiber medium (Figure 3).

SUPERIOR UNIFORMITY

Uniformity ensures consistent filtration performance and flow characteristics within one segment, and from one segment to another in a multi-segment configuration.

This medium consists of sintered stainless steel fibers configured to create a continuous tapered pore structure. The downstream region contains pores of a consistent diameter that provide reliable, absolute level filtration. The upstream section is made up of continuously varying pores from large to small, providing optimum prefiltration. The unique structure of the PMF medium maximizes dirt capacity, resulting in a long service life.

FS Series PMF Medium

Sectional photomicrographs of typical profiled pore structure.
**PSS Filter Medium**

Pall’s H-Series PSS media is constructed of stainless steel powders. The media is manufactured by a proprietary process that produces an open matrix of particles, all sinter-bonded to each other at the contact points (see figures 5 and 6). Pall’s unique powder lay-down and sintering techniques are designed to attain an increased void volume and maximum uniformity.

**Pall vs. Competition**

Pall’s H-Series PSS media offers more void volume than similar media. The increased void volume results in a significant increase in dirt holding capacity – double those of other sintered powder metal segments. The service life between cleaning cycles is typically two or more times longer, resulting in fewer cleaning interruptions during polymer processing. As a result, your total cost of filtration is greatly reduced.

**REDUCE POLYMER FLOW RESISTANCE 30 PERCENT**

The resistance to polymer flow is reduced by 30 percent compared to the removal efficiency of conventional powder metal segments. Pall’s H-Series PSS media delivers a much finer removal efficiency at an equal or lower pressure drop. This improvement, coupled with their excellent fluid shear characteristics, makes Pall's H-Series PSS segments the ideal solution for polymer filtration applications where gel control is essential.

**PMM Filter Medium**

Pall’s porous metal membrane (PMM) medium is an extremely robust composite of stainless steel mesh and stainless steel powder. This structure is used as a drainage material in Pall segment filters and offers great strength, permeability, and a smooth surface.
PALL - THE CHOICE FOR SUPERIOR
SEGMENT DESIGN AND CONSTRUCTION

Pall's patented slotted drainage support member provides better durability and performance.

The outstanding filtration characteristics of Segloy™ Plus, Segmax and Segmet polymer segment filters are enhanced by Pall's proprietary slotted support. This rigid support adds strength and durability to the segment while easing its cleanability. It also enhances polymer flow while minimizing the residence time of the polymer within the filter assembly. By reducing the polymer residence time, our clients can significantly reduce the creation of gels and degraded polymer at high temperature, greatly improving the appearance and performance of thin film products.

PALL SEGFIT™ INTERSEGMENT SPACERS FOR MAXIMUM PERFORMANCE

SEGFIT intersegment spacers enhance the intersegment support of Pall’s high performance filter segments. This added support helps minimize the impact of unbalanced forces that can be generated during process upsets or improper filter startup or shutdown.

This unique double concentric ring spacer offers several benefits over conventional radial spoke designs. The concentric rings provide uniform support around the entire circumference of the segment. In addition, Pall's SEGFIT spacer has approximately 16% less contact area with the filter segment when compared to the conventional flat-leg spider spacers. Its continuous series of openings prevents trapped polymer when draining. As a result, you get more structural support without sacrificing filter area. The SEGFIT spacer is available in a removable “clip-on” style configuration or may be permanently welded onto new segments.
Pall has a long and successful history of developing customized polymer segments for high viscosity, electronic grade polymer service. In fact, Pall designs all critical components of polymer filtration systems – from the microscopic fibers used in our sintered metal fiber media to valves, segment filter elements, polymer candle cartridges and complete filter housings. Leveraging advanced polymer segment modeling capabilities, we model the pressure drop and residence type of the polymer through the entire polymer segment filter system.

Pall is the only company in the world that provides totally integrated polymer filtration solutions, and our extensive experience gives us proven insight into how to meet the ever-increasing demands on film, fiber, and resin manufacturers. Pall’s unique design and fabrication expertise enables us to deliver customized products in short time frames – a capability you won’t find anywhere else.

Pall also manufactures a complete line of disposable and self-cleaning filters and liquid/liquid and liquid/gas separation devices, enabling us to offer a cost-effective solution for every step in your polymer process – from additives to extrusion.

Figure 9 - Pall Corporation provides the widest array of Industrial Filtration Products.
# Table 1

Table 1 outlines the benefits of each type of Pall polymer segment. No other company provides as many cost effective options as Pall.

<table>
<thead>
<tr>
<th>Segment Type</th>
<th>Feature</th>
<th>Advantage</th>
<th>Benefit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Segloy</td>
<td>Utilizes Dynalloy fiber metal media</td>
<td>High void volume medium engineered not to compress up to 3000 psid / 207 bar d</td>
<td>Long service life</td>
</tr>
<tr>
<td>Soft Hub</td>
<td>Economical to manufacture</td>
<td></td>
<td>Lowest price offering</td>
</tr>
<tr>
<td>Segloy Plus</td>
<td>PMM drainage material</td>
<td>Filtration to 2.5 microns Excellent gel removal</td>
<td>Consistent film, fiber, resin quality</td>
</tr>
<tr>
<td>Segmax</td>
<td>H-Series PSS media</td>
<td>Higher void volume than other powder metal elements Most robust segment that can withstand repeated cleanings</td>
<td>Long service life Lowest operating costs</td>
</tr>
<tr>
<td></td>
<td>Available with slotted support</td>
<td>3X less polymer residence time variation</td>
<td>Consistent product quality</td>
</tr>
<tr>
<td>Segmet</td>
<td>PMF media</td>
<td>Higher void volume Most uniform media Medium engineered not to compress up to 1500 psid/103 bar d</td>
<td>Long service life–up to 3X longer Highest film, fiber, resin quality</td>
</tr>
<tr>
<td>PMM drainage material</td>
<td>Filtration to 2.5 micron level Excellent gel removal</td>
<td>Highest film, fiber, resin quality</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Available with slotted support</td>
<td>3X less polymer residence time variation</td>
<td>Highest film, fiber, resin quality</td>
</tr>
</tbody>
</table>

## Bring the Benefits of Pall’s Total Fluid Management to Your Business

Pall segments deliver:
- Reduced fiber breaks
- Increased spin pack life
- Reduced film tears and inclusions
- Improved end-product quality
- Increased throughput
- Increased process reliability
- Reduced downtime and maintenance
- Protection of critical line components

![Figure 10 - Polymer flow path through a stack of segments into the central core.](image-url)
TABLE 2 - Pall Segment Filter Construction

Determine which Pall segment filter retention is the best for your application.

<table>
<thead>
<tr>
<th>Media/Hardware - Material of Construction</th>
<th>Segloy</th>
<th>Segloy Plus</th>
<th>Segmax</th>
<th>Segmet</th>
</tr>
</thead>
<tbody>
<tr>
<td>Application</td>
<td>Dynalloy</td>
<td>PET¹ film</td>
<td>PET¹ film</td>
<td>Polycarbonate film</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Display film</td>
<td>Display film</td>
<td>Display film</td>
</tr>
<tr>
<td>Media/ Hardware</td>
<td>316L/316</td>
<td>316L/316</td>
<td>316L/304</td>
<td>316L/304</td>
</tr>
<tr>
<td>Hub Choices</td>
<td>Soft</td>
<td>Split with slotted support</td>
<td>Solid with mesh support</td>
<td>Solid with mesh support</td>
</tr>
<tr>
<td>Support</td>
<td>Mesh or slotted</td>
<td>Mesh or slotted</td>
<td>Mesh or slotted</td>
<td>Mesh or slotted</td>
</tr>
<tr>
<td>Available Ratings-microns</td>
<td>2 to 80 microns²</td>
<td>10 microns²</td>
<td>8-55 microns³</td>
<td>2.5 to 30 microns³</td>
</tr>
<tr>
<td>Maximum Temperature/Differential Pressure</td>
<td>3000 psid @ 750°F 207 bar d @ 400°C</td>
<td>3000 psid @ 750°F 207 bar d @ 400°C</td>
<td>3000 psid @ 800°F 103 bar d @ 427°C</td>
<td>1500 psid @ 800°F 103 bar d @ 427°C</td>
</tr>
<tr>
<td>Available Diameters-Inches</td>
<td>7, 12, &amp; 15</td>
<td>7 and 12</td>
<td>7 and 12</td>
<td>7 and 12</td>
</tr>
<tr>
<td>Filter Medium Uniformity</td>
<td>Good</td>
<td>Better</td>
<td>Best</td>
<td>Best</td>
</tr>
<tr>
<td>Residence Time</td>
<td>Good</td>
<td>Good</td>
<td>Best</td>
<td>Best</td>
</tr>
</tbody>
</table>

1 Polystyrene terephthalate.
2 98% latex bead removal efficiency according to ASTM - F662-86 (Single-pass test).
3 Liquid removal efficiency ratings based on a modified F2 test method and actual particle count data.
4 Other sizes available. Please contact Pall Corporation.

**Segmax Filters**
- Pall H-Series PSS filter medium
- Drainage mesh
- Slotted support
- Split hub

**Segmax-M Filters**
- Pall H-Series PSS filter medium
- Support mesh
- Solid hub

**Segmax Filters**
- Protective stainless steel mesh
- Pall FS Series PMF filter medium
- Pall PMM support layer
- Drainage mesh
- Slotted support
- Split hub

**Figure 11** - Pall Segment Filter Construction.
Pall provides products and services for a wide range of filtration and separation applications. Our innovative, integrated solutions result in the lowest cost of ownership possible.

No matter where in the world your plant is located, Pall’s network of experts can respond in 24 hours or less. Our experienced service team will assist with all aspects of your Pall polymer system including system installation and startup. We also provide comprehensive training for production personnel and offer a full range of maintenance and service contracts.

Unique in the filtration industry, specialists from Pall Scientific and Laboratory Services (SLS) can work with you to develop the best solutions to gel control and particulate removal needs. This technical service involves extensive work both in the SLS laboratories, and in some instances on site.

Included as part of Pall’s extensive test facilities is a polymer melt extrusion test laboratory. This test facility consists of a polymer dryer, extruder, feed pumps, filter housings, and associated controls and monitoring equipment. It is used in the development and optimization of filter media and element design for polymer melt applications. It also provides a very accurate means of predicting polymer filtration performance and a means of comparing filtration performance to other media and element designs. Test housings are available for flat sheet media, segments, and pleated elements. The capabilities include permeability and filter life determinations in actual polymer melt filtration service.
A wealth of experience in testing and repair services

Pall’s extensive testing and repair service ensures that all cleanable-type polymer filters will perform to their specifications for many years and provide reliable, trouble-free use. This wraparound service gives polymer customers a single source for the specification, supply, cleaning methods and repair of their polymer filters.

No matter what the application, we invite you to put our resources to work to help you meet all your polymer melt filtration challenges.

We’re on call -- available wherever and whenever you need us. To find out more about how Pall can help your business, call us at 888.873.7255, visit www.pall.com, or contact your local Pall representative.