



Pall Corporation

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

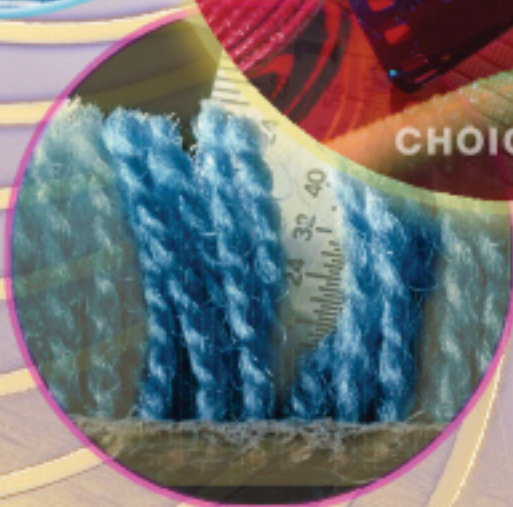


TECHNOLOGY



VALUE

CHOICE



Filtration. Separation. Solution.SM

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.

ENHANCED
QUALITY

HIGH
EFFICIENCY

MORE CHOICES,
GREATER VALUE



IT ALL STARTS WITH THE MEDIA

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.



Dynalloy is made from precision-processed fine metal fibers ranging in size from 2 to 38 microns in diameter, and is designed to incorporate specific filtration properties.

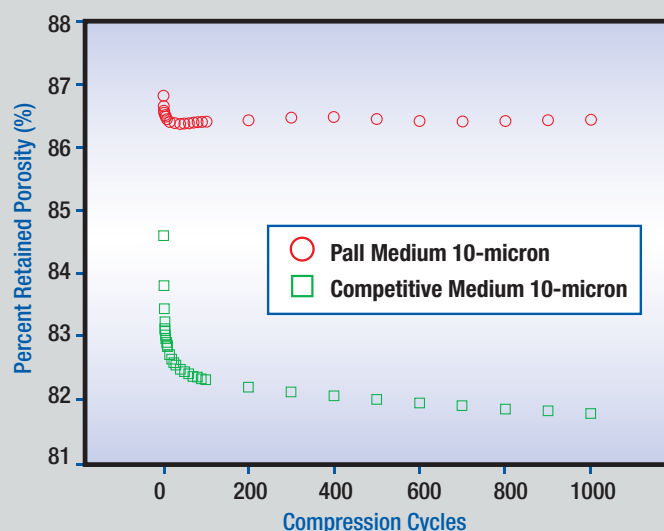


Figure 1 - Pall medium offers superior resistance to compression

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

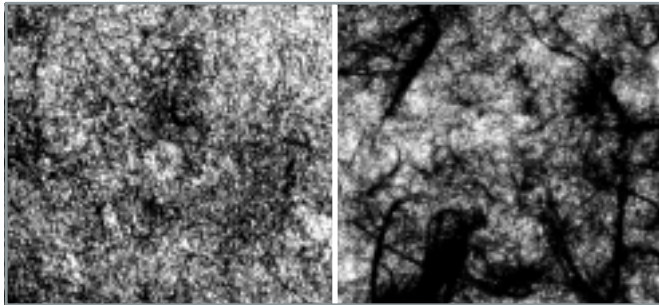


Figure 2

Figure 3

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

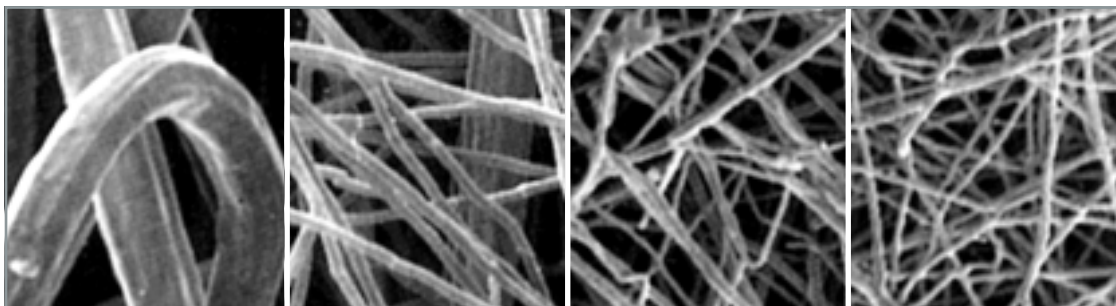


Figure 4

Flow

Sectional photomicrographs of typical profiled pore structure.

PALL'S PMF
SERIES ALSO
OFFERS
EXCELLENT GEL
REMOVAL
CAPABILITIES

PALL - THE IDEAL SOLUTION FOR POLYMER FILTRATION

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

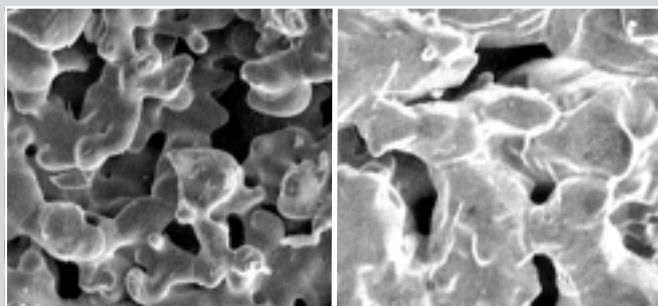


Figure 5

Figure 6

Shown is high void volume of Pall H-Series PSS medium (Figure 5) vs. conventional sintered powder metal medium of equivalent efficiency (Figure 6).

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.

TOUGH AND
DURABLE TO
WITHSTAND THE
RIGORS OF
POLYMER
FILTRATION
APPLICATIONS

SPECIALLY
DESIGNED FOR
MAXIMUM
DIRT-HOLDING
CAPACITY

REDUCE YOUR
DOWNTIME AND
FILTRATION COSTS

PALL - THE CHOICE FOR SUPERIOR SEGMENT DESIGN AND CONSTRUCTION



Figure 7 - Pall Slotted Support

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



Figure 8 - Pall Segfit Spacer

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'S UNIQUE
TECHNOLOGY

DESIGN, DEVELOP, DELIVER

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.

PALL POLYMER SEGMENTS -

OPTIMAL DESIGNS FOR EVERY APPLICATION

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.

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

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

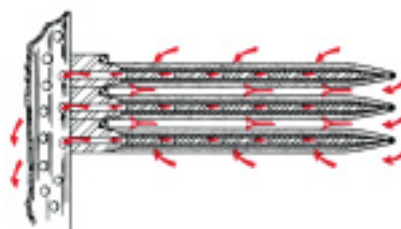


Figure 10 - Polymer flow path through a stack of segments into the central core.

TABLE 2 - Pall Segment Filter Construction

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

	Segloy	Segloy Plus	Segmax	Segmet
Media	Dynalloy	Dynalloy/PMM	PSS	PMF/PMM
Application	Packaging film Specialty, Viscous polymers Display film	PET ¹ film Display film	PET ¹ film Display film	Polycarbonate film Display film
Media/Hardware - Material of Construction	316L/316	316L/316	316L/304	316L/304
Hub Choices	Soft Solid with mesh support Solid with slotted support	Split with slotted support Solid with mesh support	Solid with mesh support Split with slotted support	Solid with mesh support Split with slotted support
Support	Mesh or slotted	Mesh or slotted	Mesh or slotted	Mesh or slotted
Available Ratings-microns	2 to 80 microns ²	10 microns ²	8-55 microns ³	2.5 to 30 microns ³
Maximum Temperature/ Differential Pressure	3000 psid @ 750°F 207 bar d @ 400°C	3000 psid @ 750°F 207 bar d @ 400°C	3000 psid @ 800°F 207 bar d @ 427°C	1500 psid @ 800°F 103 bar d @ 427°C
Available Diameters-Inches ⁴	7 , 12 , & 15	7 and 12	7 and 12	7 and 12
Filter Medium Uniformity	Good	Better	Best	Best
Residence Time	Good	Good	Best	Best

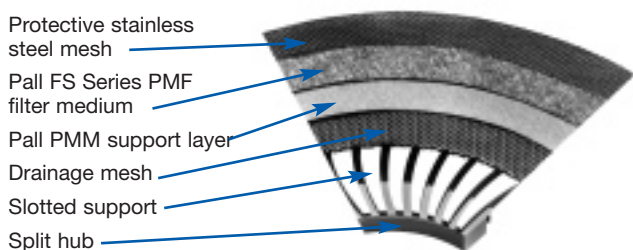
¹ Polyethylene terephthalate.

² 98% latex bead removal efficiency according to ASTM - F662-86 (Single-pass test).

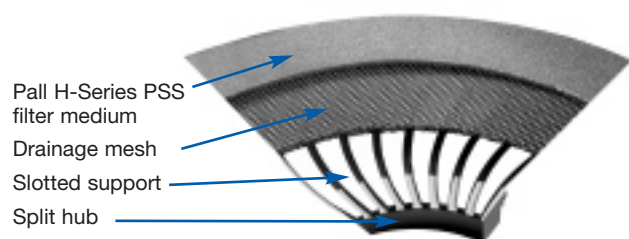
³ Liquid removal efficiency ratings based on a modified F2 test method and actual particle count data.

⁴ Other sizes available. Please contact Pall Corporation.

Segmet Filters



Segmax Filters



Segmax-M Filters

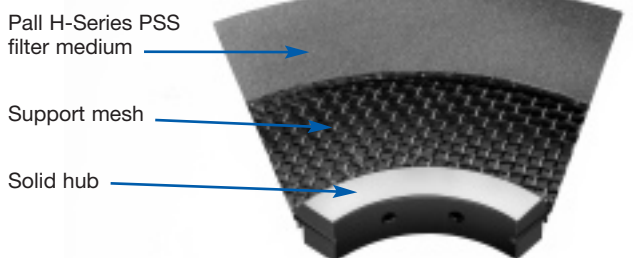


Figure 11 - Pall Segment Filter Construction.

TOTAL FLUID MANAGEMENT -

FROM BOSTON TO BEIJING

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.

PALL SERVICES
FOR THE
POLYMER
INDUSTRY

SEE WHAT PALL CAN DO!

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.



Figure 12 - Multi-segment stack assembly

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.



Pall Corporation

New York - USA

888.873.7255	toll free
516.484.5400	phone
516.484.0364	fax

Portsmouth - UK

+44 (0) 23 9230 2357	phone
+44 (0) 23 9230 2509	fax
processuk@pall.com	email

Paris - France

+33 1 3061 3800	phone
+33 1 3061 2261	fax

Dreieich - Germany

+49 6103 307176	phone
+49 6103 307182	fax


Milan - Italy

+39 2 477961	phone
+39 2 412298	fax

Visit us on the Web at www.pall.com

Pall Corporation has offices and plants throughout the world in locations including: Argentina, Australia, Austria, Belgium, Brazil, Canada, China, France, Germany, India, Indonesia, Ireland, Italy, Japan, Korea, Malaysia, Mexico, the Netherlands, New Zealand, Norway, Poland, Puerto Rico, Russia, Singapore, South Africa, Spain, Sweden, Switzerland, Taiwan, Thailand, United Kingdom, United States, and Venezuela. Distributors are located in all major industrial areas of the world.

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