

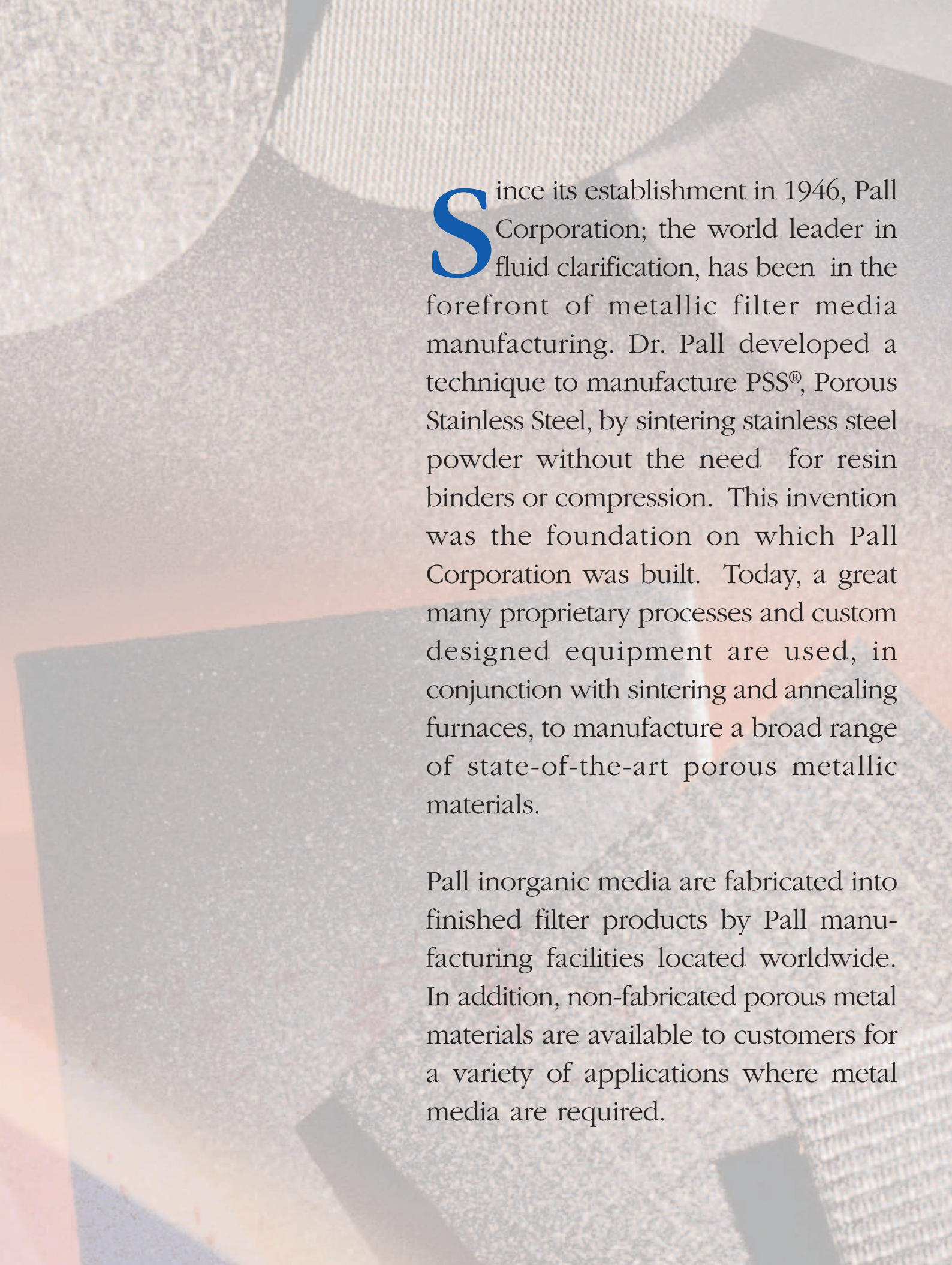


Pall Corporation

# Pall Porous Inorganic Media Guide

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





Since its establishment in 1946, Pall Corporation; the world leader in fluid clarification, has been in the forefront of metallic filter media manufacturing. Dr. Pall developed a technique to manufacture PSS®, Porous Stainless Steel, by sintering stainless steel powder without the need for resin binders or compression. This invention was the foundation on which Pall Corporation was built. Today, a great many proprietary processes and custom designed equipment are used, in conjunction with sintering and annealing furnaces, to manufacture a broad range of state-of-the-art porous metallic materials.

Pall inorganic media are fabricated into finished filter products by Pall manufacturing facilities located worldwide. In addition, non-fabricated porous metal materials are available to customers for a variety of applications where metal media are required.

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# Pall Porous Inorganic Media Guide

## Unique Capabilities

Through continuous research, Pall Corporation has pioneered many unique porous metallic media and refined manufacturing processes to meet specific application requirements. Focusing on industry needs, Pall Corporation remains the leader in state-of-the-art technology through new porous metal product development.

In response to the ever-increasing demand for greater dirt holding capacity and superior overall performance, Pall now offers the widest array of standard inorganic media and has the ability to produce an unlimited combination of porous metal products including:

- Integral composites of sintered mesh layers to meet precise flow, pressure drop, or thickness requirements.
- Various metallic media combinations such as: powder metal sintered to the upstream surface of metal meshes, powder metal sintered within the pore structure of woven wire of mesh, and metal fibers sintered onto powder metal and/or wire mesh.
- Multi-layer composites of inorganic oxides on porous metal powder support tubes.
- Unique metal media combinations can be developed to produce a variety of customized filter media products with exceptionally fine absolute rated depth filtration characteristics.
- Also, many of these inorganic media are available in a wide selection of alloys to produce porous inorganic media products which are suitable for extreme temperatures and corrosive environments.

Since Pall is a manufacturer of all types of porous inorganic media, we can select the best material and optimize manufacturing processes to meet specific application requirements.

*Inconel is a registered trademark of Inco Alloys International.*

*Hastelloy is a registered trademark assigned to Haynes International.*

*Carpenter is a registered trademark of Carpenter Steel Company.*



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# Inorganic Media Selection Guidelines

Selection of the most suitable porous inorganic medium for a given application should be based on the following criteria:

- Operating conditions (temperature, pressure, and flow rate)
- Removal rating and efficiency
- Required clean pressure drop
- Required alloy (chemical and temperature compatibility)
- Required media strength (i.e., ultimate tensile strength, fatigue strength, or modulus of elasticity)

By first understanding the application and identifying the specific requirements, we can focus on a medium that meets or exceeds our customer's expectation. Several of our porous metal media were developed with specific applications and optimal performance in mind, such as: PMF porous metal fiber for polymer filtration, and H-Series PSS for polymer segment style filters.

Many different metallic media selections can be made for a wide variety of applications. When in doubt, please contact your Pall representative for assistance.



*The Raw Material of Metallic Media*

# Why Inorganic Media?

## Characteristics of Sintered Metal Filter Media

### Controlled Pore Size

All sintering is performed in high temperature vacuum or controlled atmosphere furnaces. Once the material is sintered, the pore size is fixed and the filter medium will produce consistent, reliable removal. To ensure absolute retention ratings, each grade of medium is tested by the bubble point technique, which correlates to the largest diameter hard spherical particle that can pass through the medium.

### High Pressure and Temperature Capabilities

Inorganic media are inherently strong and, when properly supported, can provide filtration products capable of withstanding very high differential pressures – up to 10,000 psid (690 bar). One of their outstanding characteristics is the extreme temperatures which they can tolerate. Temperatures can range from cryogenic, as low as -450°F (-268°C), to temperatures in excess of 1500°F (816°C), depending upon the metal alloy used, the type of medium selected and the atmosphere to which the media will be exposed.

### Freedom from Extractables

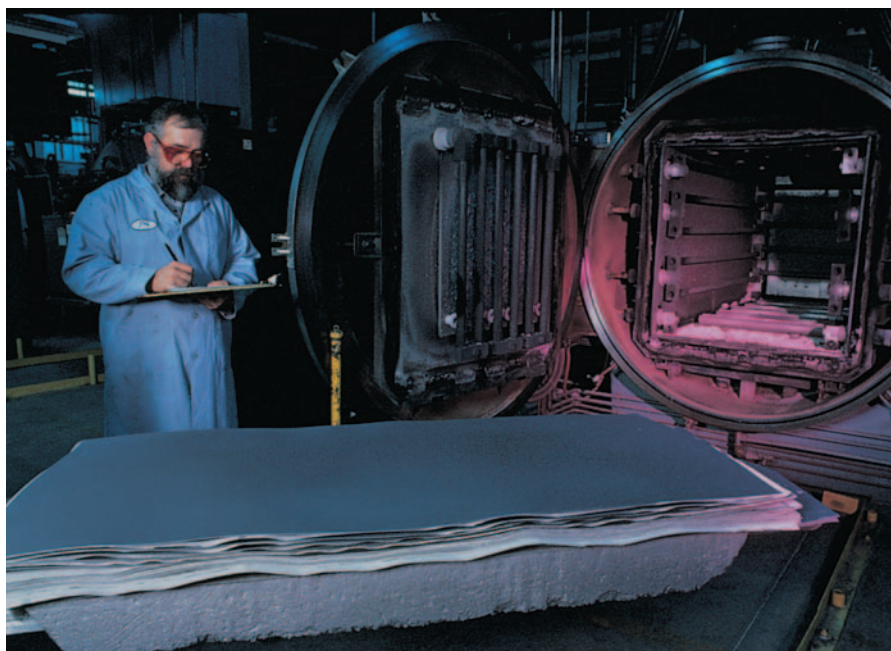
Unlike polymeric or resin impregnated media, Pall metallic filter media will not contribute soluble or extractable materials to contaminate or impart taste or odor to the filtered product.

### Freedom from Media Migration

All Pall sintered metal filters are free from particle or fiber shedding and will not contaminate the filtrate.

### Corrosion Resistance

Stainless steel is the standard material of construction; it exhibits excellent corrosion resistance in most fluids and service conditions. As the result of our superior metallurgical and sintering techniques, all of our stainless steel metal media is produced with a maximum carbon content of .03%. Our sintering process is very effective in minimizing carbon content; thus, chromium carbide precipitation at the metal boundaries, which causes intergranular corrosion, is kept to a minimum. This results in a porous metal media with longer in-service life. Slight variations in operating conditions, especially those associated with system upset, can have a major impact on corrosion resistance. For existing systems, samples can frequently be supplied for long-term exposure and verification of alloy selection.



*Sintering Furnace at Cortland, NY*

# Reliability



*Bubble Point Testing Metallic Media*

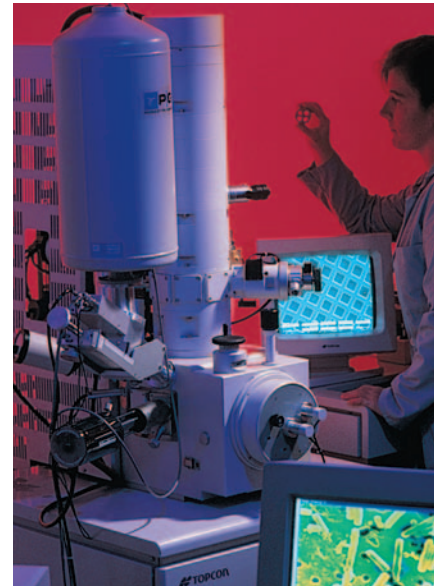
To ensure the highest quality end product we monitor all incoming raw materials. Porous metal powder is analyzed, not only for its metallurgical composition, but also for particle size distribution, which is critical to the end product. In the case of woven wire mesh, metallurgical properties are monitored, as is the weave and wire diameter. Control of metallurgy and wire diameter are also vital to fiber metal filter media.

In the case of 316L materials, carbon content is checked before and after the sintering operation. Each production lot of material is bubble point tested to measure the maximum size of a hard spherical particle which would pass, as well as being tested for permeability, thickness, and carbon content.

## Technical Support

Pall Corporation is dedicated to providing quality products and services to our customers. We have a complete technical staff to review your application and recommend alloys, level of filtration, removal grade, and type of media appropriate for specific application conditions.

Pall also maintains a unique Scientific Laboratory and Services Department, staffed by Senior Scientists experienced in evaluating customer filtration applications and requirements, and supported by extensive laboratories and analytical tools. Their services are available to complement those of the design and production engineering staff at Pall Corporation.



*Scanning Electronic Microscope in SLS Laboratory*

# PSS® Medium

Pall PSS 316L Stainless Steel Medium is produced by a proprietary sintering process. No binders or other extraneous substances are introduced, nor is pre-compression of the powder employed prior to sintering. The result is metallic material with a lower pressure drop at a given flow rate and approximately 20% more open area per unit area than other sintered metals of similar efficiency. By controlling carbon content, the finished product qualifies as 316L grade, which is less susceptible to carbide precipitation at the metal's grain boundaries. Excellent corrosion resistance results; this ensures longer in-service life.

Pall PSS media are available in six standard grades with absolute removal ratings in liquid service from 55 micrometers (coarsest grade) to 5 micrometers (finest grade).

In addition to the standard 316L medium, most PSS grades can be furnished in the following alloys:

- Stainless Steel Type 304L, 310S, 347
- Inconel® 600, 671
- Nickel 200
- Hastelloy® X, Hastelloy B2, Hastelloy C276
- Carpenter® 20

## Applications

Various applications utilizing PSS medium include:

### Chemical and Petrochemical Industries

- Catalyst activator/Regenerator off-gas
- Filtering industrial gases
- Filtering cryogenic fluids
- High temperature stack gas sampling

### Pharmaceutical/Food and Beverage Industries

- Process and sterilizing steam filtration
- Beer and wine filtration

### Industrial Processing

- Chromatography
- Fluidizing plates for coal gasification
- Fluid conditioning

## PSS Medium

Features	Benefits
Mechanical strength	Reliability, long usable life
Temperature resistance	Variety of alloys can be produced to meet temperature requirements ranging from -450°F/268°C to 1700°F/927°C
High durability	Assured chemical compatibility with process fluids and repeatedly cleanable
Ability to withstand reverse flow	Lower maintenance and operating costs
Uniform permeability	Offers low resistance to flow



# Technical Data

## PSS Medium Removal Efficiency (in Microns)

Media Grade	Removal Ratings				
	Liquid Service <sup>1</sup>			Gas Service <sup>2</sup>	
	50%	99%	100% <sup>3</sup>	Weight % Removal	100%
PO5	0.5	3	5	>99.99	0.4
PO9	2	7	9	99.98	0.8
H	5	9	13	99.97	1.3
F	8	15	20	99.94	2.8
E	15	25	35	99.80	11
D	20	40	55	99.50	20

1 Based on modified F2 efficiency test which measures removal efficiency by particle count. The 50% removal efficiency values should be used when comparing PSS efficiency data to other competitive sintered powder metal media.

2 Weight percent removal data based on AC Fine Test Dust in air.

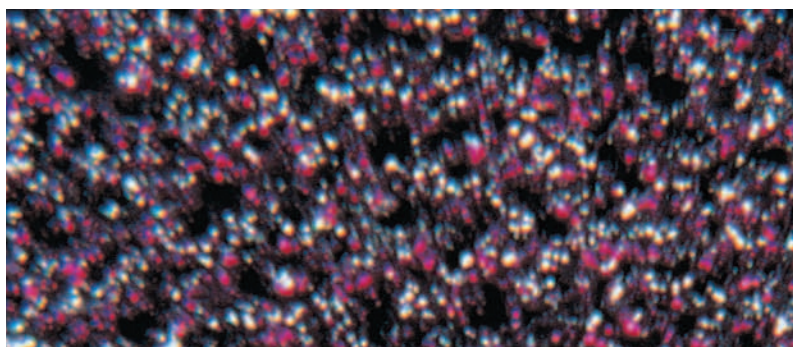
3 Absolute retention ratings based on actual particle count data.

## PSS Medium Standard Thickness

Nominal Thickness (in.)	Actual Thickness Limits (in.)/(cm)
1/16	.050-.075/0.127-0.191
1/8	.110-.140/0.28-0.36

1 PSS grades PO5 and PO9 are available in nominal 1/16" thickness only, having actual thickness limits of .035/.055".

2 Other thicknesses and closer tolerance are available on special order.



PSS Medium

## Flow Characteristics

### PSS Medium

Grade	Clean Pressure Drop			
	Gaseous Service		Liquid Service	
	Air Permeability <sup>4</sup>		Water Permeability <sup>5</sup>	
	psid-ft <sup>2</sup> /scfm	mbar-m <sup>2</sup> /m <sup>3</sup> /min	psid-ft <sup>2</sup> /gpm	mbar/lpm/sq m
1/8D	0.0025	0.56558	0.0136	0.023
1/8E	0.0062	1.40264	0.038	0.064
1/8F	0.0140	3.16725	0.104	0.176
1/8H	0.0459	10.38405	0.46	0.778
1/16D	0.0013	0.29410	0.0068	0.012
1/16E	0.0045	1.01804	0.019	0.032
1/16F	0.0083	1.87773	0.052	0.088
1/16H	0.0250	5.65580	0.23	0.39
PO5	0.0835	18.89037	0.85	1.44
PO9	0.0634	14.34311	0.27	0.457

4 Pressure drop in psi obtained by multiplying value shown by actual gaseous flow rate desired (ACFM), ratio of viscosities (actual cp 0.018), all divided by total filtration area (ft<sup>2</sup>) of element selected.

5 Pressure drop in psi obtained by multiplying value shown by actual flow desired in gpm, viscosity of liquid in centipoise (if other than 1 cp), all divided by total filtration area (ft<sup>2</sup>) selected.



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## H-Series PSS® Medium

As a result of Pall's continuing efforts to improve processes and further develop powder metal products, our newest series of powder metal media is manufactured by a proprietary process utilizing tightly controlled particle distribution. The powder laydown and sintering techniques have been optimized to achieve an open matrix with increased void volume and an exceptionally high degree of uniformity over our standard PSS media. The result is a sintered powder metal medium that has been specifically optimized for the stringent requirements of the polymer industry.

The standard H-Series PSS medium is type 316L; other alloys are available upon request. This unique product is available in 15, 25 and 55 micrometers absolute removal ratings in liquid service, in disc form only, up to 12.5 inch diameter.

### Applications

Polymer segment filters manufactured from H-Series PSS media are ideally suited for final filtration stages prior to the extrusion of thin base films such as:

- Polyester film for audio and video tape
- Film for floppy discs for computer information storage
- High performance polyethylene and polypropylene films for packaging
- Also, small discs can be manufactured from our standard production medium for use in filtration of polyurethane plastic for the production of medical tubing

### H-Series PSS Medium

Features	Benefits
High degree of uniformity	Improved gel control
Greater void volume	Increased dirt holding capacity and longer on-stream life
Reduced system interruption	Total filtration cost for cleaning is greatly reduced

# Technical Data

## H-Series PSS Medium Removal Efficiency (in Microns)

Media Grade	Removal Ratings Liquid Service <sup>1</sup>		
	90%	99%	100%
H150	6.5	9	15
H250	10.5	18	25
H550	33	54	55

<sup>1</sup> Based on modified F2 test which measures removal efficiency by particle count. The 90% removal efficiency values should be used when comparing H-Series PSS with competitive powder metal segment media.

## H-Series PSS Medium Standard

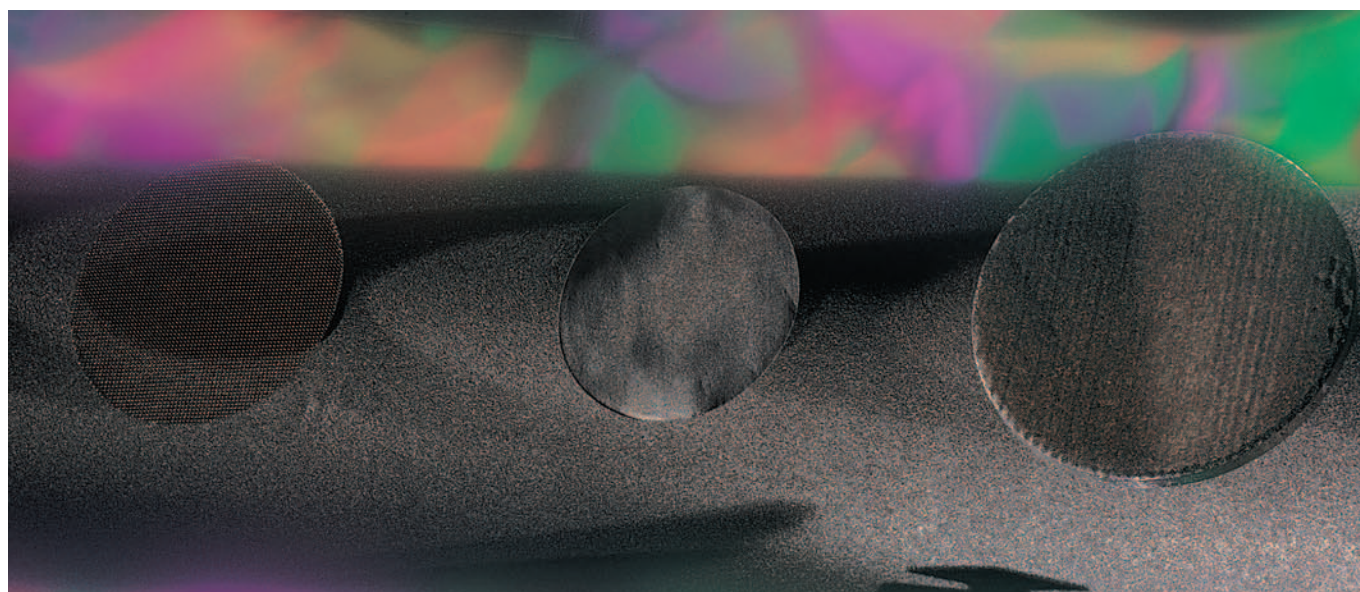
Diameter	Thickness Range
8"/20.32 cm	.065 - .079"/0.035 - 0.2 cm
12"/30.48 cm	.075 - .086"/0.19 - 0.22 cm

## Flow Characteristics

### H-Series PSS Medium

Grade	Clean Pressure Drop			
	Gaseous Service		Polymer Service	
	Air Permeability psid-ft <sup>2</sup> /scfm	mbar-m <sup>2</sup> /m <sup>3</sup> /min	Polymer Permeability <sup>2</sup> psid-ft <sup>2</sup> /pph-poise	mbar-m <sup>2</sup> /kg-hr-poise
H150	0.00574	1.29857	.00888	0.125
H250	0.00203	0.45925	.00341	0.048
H550	0.00155	0.35066	.00072	0.010

<sup>2</sup> The polymer permeability data are for filtration of Newtonian or near Newtonian polymer melts.



H-Series PSS Medium

## S-Series PSS® Medium

In response to increasing demand for greater dirt holding capacity and superior performance, S-Series PSS porous stainless steel cylinders have been developed. These high performance seamless cylinders are manufactured by a proprietary process, thus eliminating the undesirable effects of forming and longitudinal welding. This produces an increase in effective filter area over standard PSS media, which is sintered in a flat sheet form and requires rolling and welding to fabricate into cylindrical filter elements. In addition, the manufacturing technique results in a higher void volume, and lower resistance to flow than our flat sheet PSS medium. S-Series PSS filters offer high performance with economy of use.

Standard S-Series PSS cylinders are manufactured in Type 316L Stainless Steel and are available in 5 to 35 micrometers absolute removal rating in liquid service. Standard diameters available are ½" (12.7 mm), 1½" (38.1 mm), 2" (50.8 mm), and 2¾" (60.3 mm), with lengths to 20" (50.8 cm). Other diameters are available on special order. Other combinations or configurations can be produced to meet specific customer requirements. Other available alloys include:

- Nickel
- Monel 400
- Inconel
- Iron Aluminide
- Hastelloy C276

Standard manufacturing tolerances apply to S-Series PSS cylinder dimensions. Specific application requirements should be reviewed prior to order placement to ensure proper installation of our products. If critical dimensional tolerances are required, please consult the factory.

### Applications

Pall S-Series PSS cylinders are typically fabricated into filter elements to be used in critical filtration, blowback, and backwash applications in the following industries:

- Nuclear-Radwaste incinerators
- Chemical-Jet pulse blowback for the recovery of solids/catalyst
- Petrochemical-Fluid bed reactor off-gas systems in petrochemical plants and refineries

### S-Series PSS Medium

Features	Benefits
No longitudinal weld seam	Increased effective filter area
High void volume	Increased dirt holding capacity and greater resistance to chemical and thermal stresses
High degree of uniformity with a narrow pore size distribution	Low differential pressure
	Precise removal efficiency and a longer economical life



# Technical Data

## S-Series PSS Medium Removal Efficiency (in Microns)

Media Grade	Removal Ratings				Gas Service <sup>2</sup>	
	Liquid Service <sup>1</sup>				Weight % Removal	100%
	50%	90%	99%	100% <sup>3</sup>		
S050	0.5	2	3	5	>99.99	0.4
S100	4	7	8	10	99.98	0.8
S200	7	10	14	20	99.94	2.8
S350	13	17	24	35	99.40	11

1 Liquid removal efficiency ratings are based on a modified F2 test method and actual particle count data. The 50% removal values should be used when comparing PSS® S-Series efficiency data to other competitive sintered powder media.

2 Air flow used for these data was 10-16 cfm/ft<sup>2</sup>.

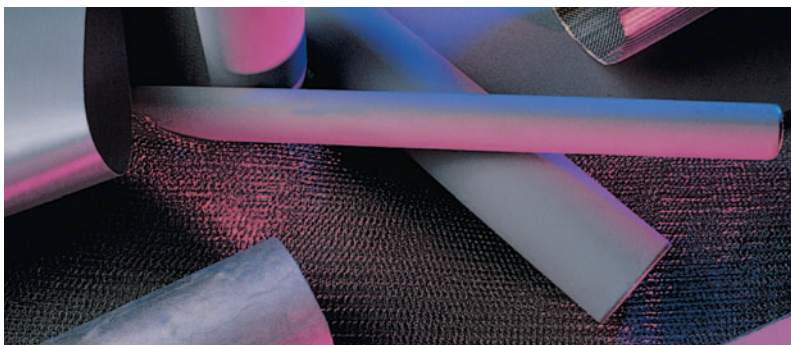
3 Absolute retention ratings based on actual particle count data.

## S-Series PSS Medium

### Standard Available Nominal Wall Thickness

1/16"/0.159 cm

1/8"/0.318 cm



S-Series PSS Tubes

## Flow Characteristics

### S-Series PSS Medium

Grade	Clean Pressure Drop			
	Gaseous Service		Liquid Service	
	Air Permeability <sup>4</sup>		Water Permeability <sup>5</sup>	
	psid-ft <sup>2</sup> /scfm	mbar-m <sup>2</sup> /m <sup>3</sup> /min	psid-ft <sup>2</sup> /gpm	mbar/lpm/sq m
S050	0.048	10.85914	0.54	0.91
S100	0.016	3.61971	0.21	0.36
S200	0.003	0.67870	0.04	0.07
S350	0.0001	0.02262	0.01	0.02

4 Pressure drop in psi obtained by multiplying value shown by actual gaseous flow rate desired (ACFM), ratio of viscosities  $\frac{\text{actual cp}}{0.018}$ , all divided by total filtration area (ft<sup>2</sup>) of element selected.

5 Pressure drop in psi obtained by multiplying value shown by actual flow desired in gpm, viscosity of liquid in centipoise (if other than 1 cp), all divided by total filtration area (ft<sup>2</sup>) selected.

# Rigimesh® and Supramesh® Medium

Rigimesh medium is a sintered woven wire mesh product having the greatest permeability for comparable removal efficiency. Sintered in a high temperature vacuum furnace, the wires are bonded at every point of contact to produce an extremely strong metallic medium with wires that will not shift under stress; thus, the pore size and integrity is continuously maintained. Since sintering increases mechanical strength, this patented Pall process permits the use of finer diameter wires in manufacturing the medium. The result is a filter with greater dirt holding capacity and permeability than that of an unsintered mesh of comparable removal rating.

We have the ability to sinter multi-layer composites of different meshes on special order, to meet application needs for precise flow, pressure drop, thickness, or strength.

Supramesh Medium is a combination of Rigimesh woven wire mesh with stainless steel powder sinter-bonded to its upstream surface. This results in a material that provides exceptionally fine depth filtration, complete freedom from media migration, and extremely low pressure drop.

Our standard alloy for both Rigimesh and Supramesh is type 304L stainless steel, with 316L and other alloys available on special order. Removal ratings for Rigimesh range from 18 to 450 micrometers absolute in liquid service. The standard Supramesh medium is available in 15 micrometers absolute, but we have the ability to customize this product to meet specific requirements.

## Rigimesh Medium

Features	Benefits
Controlled pore size with a sharper particle size cut off than depth filter media	Assured absolute particle retention
Finer sinter bonded woven wires	Long on-stream-life

## Supramesh Medium

Features	Benefits
High dirt holding capacity	Longer life before cleaning is required
Fine, pleatable depth filtration medium	Can achieve increased filter area within a small envelope



Cross Sectional Schematic of Supramesh Medium

## Applications

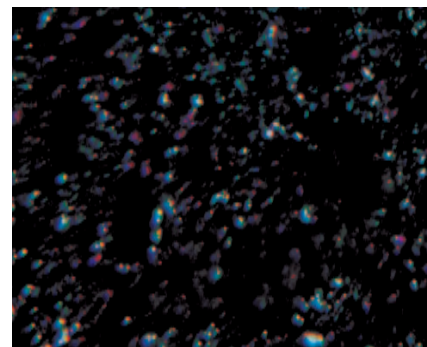
Typical applications for which Rigimesh medium or Supramesh medium are the media of choice might be:

### Chemical

- Catalyst/solids recovery backwash systems
- Cryogenic fluid filtration

### Pharmaceutical

- Carbon/catalyst recovery from bulk pharmaceutical chemicals



Supramesh Medium

# Technical Data

## Rigimesh/Supramesh Media Removal Efficiency (in Microns)

Media Grade	Removal Ratings				Nominal Thickness (in.)/(cm)
	Liquid Service <sup>1</sup>		Gas Service <sup>2</sup>		
	98%	100%	98% Removal by Weight	100% Removal	
Supramesh Z	1.5	15	0.5	2	.011/0.028
Rigimesh					
K	5	18	3.5	13	.006/0.015
J	10	25	6	18	.006/0.015
M	17	45	11	25	.006/0.015
R	40	70	30	55	.011/0.028
S	70	105	50	85	.010/0.025
T	145	225	120	175	.014/0.036
A	300	450	250	350	.019/0.048

1 Based on modified F2 efficiency test which measures removal efficiency by particle count.

2 Weight percent removal data based on AC Fine Test Dust in air. Absolute retention ratings based on actual particle count data.

## Flow Characteristics

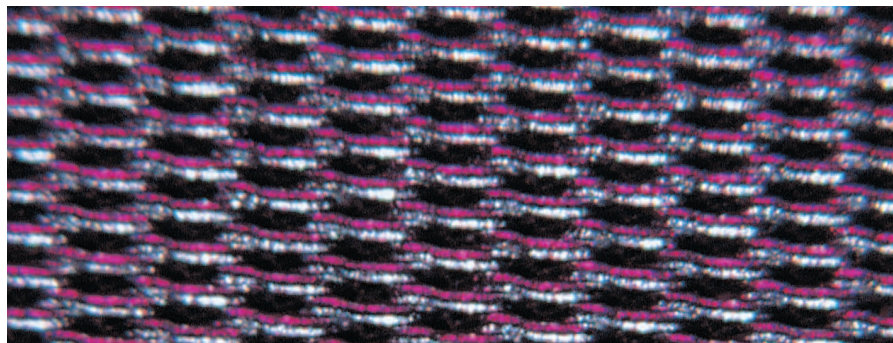
### Rigimesh Medium

Grade	Clean Pressure Drop			
	Gaseous Service		Liquid Service	
	Air Permeability <sup>3</sup> psid-ft <sup>2</sup> /scfm	mbar-m <sup>2</sup> /m <sup>3</sup> /min	Water Permeability <sup>4</sup> psid-ft <sup>2</sup> /gpm	mbar/lpm/sq m
A	*	*	*	*
T	*	*	*	*
S	0.000055	0.01244	0.00015	0.00025
R	0.00009	0.02036	0.0002	0.00034
M	0.00018	0.04072	0.0005	0.00085
J	0.00029	0.06561	0.0040	0.00677
K	0.00085	0.19230	0.0067	0.01333
SUPRAMESH Z	0.0030	0.67870	0.0333	0.05633

3 Pressure drop in psi obtained by multiplying value shown by actual gaseous flow rate desired (ACFM), ratio of viscosities actual<sub>op.</sub>, all divided by total filtration area (ft<sup>2</sup>) of element selected.  
0.018

4 Pressure drop in psi obtained by multiplying value shown by actual flow desired in gpm, viscosity of liquid in centipoise (if other than 1 cp), all divided by total filtration area (ft<sup>2</sup>) selected.

\* Properties are not readable.



Rigimesh Medium



Cross Sectional Schematic of Rigimesh Medium



## PMM® Medium

A thin sintered matrix of stainless powder within the pore structure of sintered stainless steel woven wire mesh, PMM medium combines the best qualities of our PSS sintered powder and Rigimesh sintered woven wire mesh media. The fine powders provide excellent depth filtration down to 2 micrometers absolute in liquid service. The thin woven wire mesh support structure is exceptionally strong and the composite is quite ductile, permitting PMM porous metal membrane medium to be pleated into high area filter packs.

This medium has a smooth surface and excellent uniformity. It is, therefore, an excellent choice for solid separation and solids recovery applications. In both liquid and gas service, this filter medium will function as an exceptionally high performance septum.

Standard material of construction is all 316L Stainless Steel, but other alloys, such as Inconel, 304, and 310 Stainless Steel are available on special order.

### Applications

PMM filters are well suited for a wide range of gas and liquid applications including, but not limited to:

#### Industrial Processing

- Steam filtration, sanitizing, etc.
- Incinerators

#### Chemical Processing

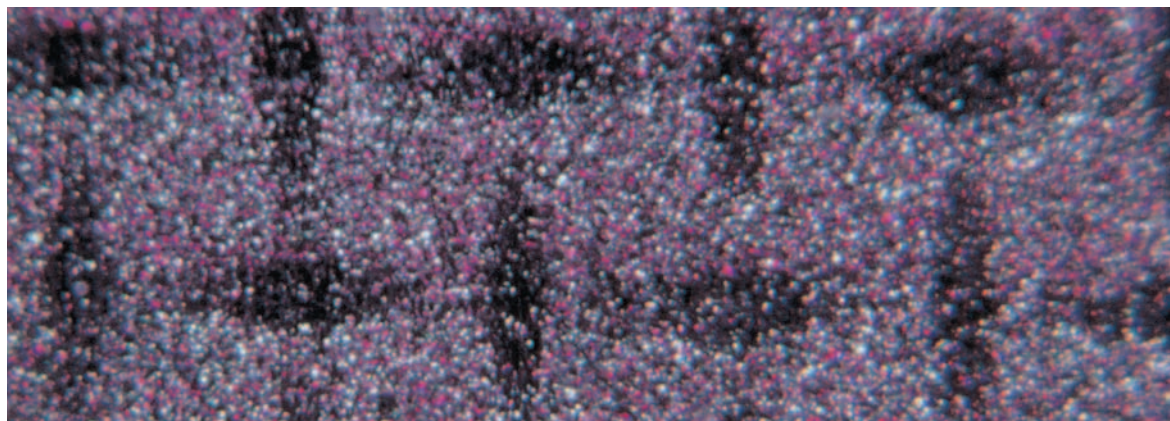
- Fluid bed catalyst reactors
- Product dryers
- Emission control

#### Nuclear

- Waste disposal systems
- Condensate polishing systems

### PMM Medium

Features	Benefits
Very fine removal efficiencies	Provides efficient cake formation and release for solids recovery applications
Thin, pleatable filter medium in a compact filter size	Provides higher surface area
Repeatedly cleanable	Economical choice for many prefiltration applications to reduce solids loading of final filters



PMM Medium

# Technical Data

## PMM Medium Removal Efficiency (in Microns)

Media Grade	Removal Ratings					Nominal Thickness (in.)/(cm)
	Liquid Service <sup>1</sup>			Gaseous Service <sup>2</sup>		
	90%	99%	100%	Weight % Removal	100%	
M020	0.1	0.5	2	> 99.99	0.4	.0055/0.0139
M050	0.6	2	5	99.99	0.6	.0055/0.0139
M100	2	5	10	99.97	1.3	.0050/0.0127
M150	5	9	15	99.96	2.5	.0060/0.0152
M200	8	13	20	99.93	4.0	.0090/0.0228
M250	10	16	25	99.90	9.0	.0090/0.0228

1 Based on modified F2 efficiency test, removal efficiency by particle count.

2 Weight percent removal data based on AC Fine Test Dust in air. Absolute retention ratings based on actual particle count data.

## Flow Characteristics

### PMM Medium

Grade	Clean Pressure Drop			
	Gaseous Service		Liquid Service	
	Air Permeability <sup>3</sup> psid-ft <sup>2</sup> /scfm	mbar-m <sup>2</sup> /m <sup>3</sup> /min	Water Permeability <sup>4</sup> psid-ft <sup>2</sup> /gpm	mbar/lpm/sq m
M020	0.0943	21.33368	0.870	1.47
M050	0.0581	13.14408	0.490	0.83
M100	0.0442	9.99945	0.280	0.47
M150	0.0139	3.14462	0.170	0.29
M200	0.0114	2.57904	0.070	0.12
M250	0.0029	0.65607	0.020	0.03

3 Pressure drop in psi obtained by multiplying value shown by actual gaseous flow rate desired (ACFM), ratio of viscosities  $\frac{\text{actual cp}}{0.018}$ , all divided by total filtration area (ft<sup>2</sup>) of element selected.

4 Pressure drop in psi obtained by multiplying value shown by actual flow desired in gpm, viscosity of liquid in centipoise (if other than 1 cp), all divided by total filtration area (ft<sup>2</sup>) selected.

## PMF® Medium

By employing extremely small diameter stainless steel fibers, Pall is able to produce media with absolute removal ratings that range from 2.5 micrometers to 40 micrometers absolute in liquid service. Pall's unique patented process uses extremely small diameter fibers, resulting in high void volume media with increased dirt capacity and long life. Because of the strength imparted by the sintering operation, PMF porous metal fiber medium can also be pleated into high area filter packs. Pall manufactures three standard types of PMF medium:

- **FH Series** – High pressure (up to 1000 psi)/(69 bar) pleatable media.
- **FL Series** – Low pressure (up to 250 psi)/(17.24 bar) pleatable media.
- **FS Series** – High dirt holding capacity in a profiled pore structure for polymer segment applications.

316L is the standard material of construction.

### Applications

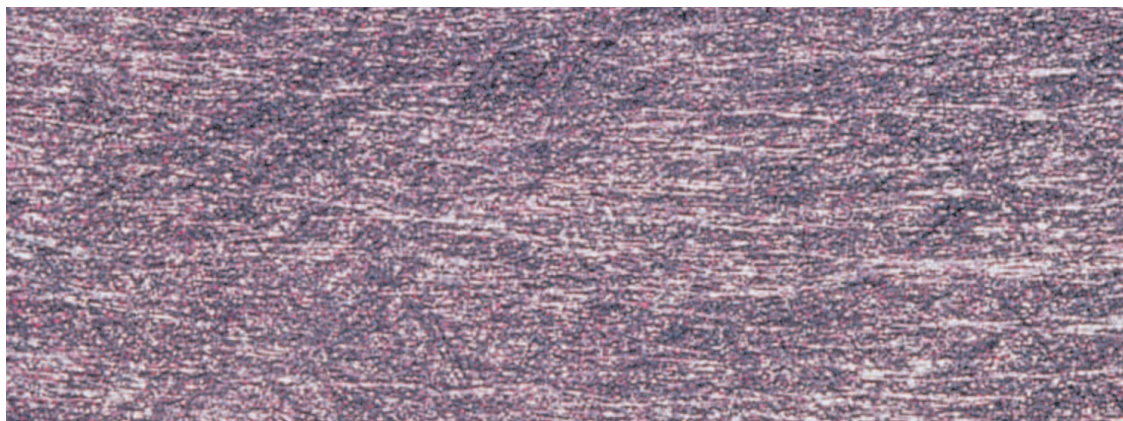
High pressure PMF medium has been optimized for polymer processing applications such as:

- Film and fiber extrusion
- Polypropylene melt filtration
- Polyester melt filtration

Low pressure PMF is typically used in the chemical processing and pharmaceutical industries where high area fine filtration is required.

### PMF Medium

Features	Benefits
Superior uniformity and maximized dirt holding capacity	Longer on-stream life
Ability to maintain filtration performance qualities after repeated cleaning cycles	Economy and reliability of use before replacement is necessary



PMF Medium



# Technical Data

## PMF High Pressure Corrugatable Porous Metal Fiber Medium

### FH Series PMF Medium Removal Efficiency (in Microns)

Media Grade	Removal Ratings Liquid Service <sup>1</sup>				Nominal Thickness (in.)/(cm)
	90%	98%	99%	100%	
FH025	<1.0	<1.0	1.4	2.5	.014/0.036
FH050	0.5	1.0	2	5	.020/0.051
FH080	2	3	4	8	.015/0.038
FH100	5	7	8	10	.013/0.033
FH150	6	9	11	15	.015/0.038
FH200	8	12	14	20	.015/0.038
FH250	10	14	17	25	.015/0.038
FH300	12	18	20	30	.015/0.038
FH400	14	20	24	40	.015/0.038

1 Liquid removal efficiency ratings are based on a modified F2 test method and actual particle count data. The 98% removal values should be used when comparing PMF grades to other competitive fiber metal media.

## PMF Low Pressure Corrugatable Porous Metal Fiber Medium

### FL Series PMF Medium Removal Efficiency (in Microns)

Media Grade	Removal Ratings Liquid Service <sup>2</sup>				Nominal Thickness (in.)/(cm)
	90%	98%	99%	100%	
FL050	2	2.5	3	5	.011/0.028
FL080	3.5	4	5	7	.016/0.041
FL100	6	8	9	10	.014/0.036
FL150	7	9	11	15	.009/0.023
FL200	11	14	15	20	.012/0.030
FL250	13	18	19	25	.012/0.030

2 Liquid removal efficiency ratings are based on a modified F2 test method and actual particle count data. The 98% removal values should be used when comparing PMF grades to other competitive fiber metal media.

## Flow Characteristics

### PMF Medium

Grade	Clean Pressure Drop			
	Gaseous Service		Liquid Service	
	Air Permeability <sup>3</sup>		Water Permeability <sup>4</sup>	
	psid-ft <sup>2</sup> /scfm	mbar/m <sup>2</sup> /m <sup>3</sup> /min	psid-ft <sup>2</sup> /gpm	mbar/lpm/sq m
FH025	0.0206	4.66038	0.210	0.355
FH050	0.0047	1.06329	0.050	0.085
FH080	0.0034	0.76919	0.035	0.059
FH100	0.0019	0.42984	0.020	0.034
FH150	0.0010	0.22623	0.010	0.017
FH200	0.0006	0.13574	0.006	0.010
FH250	0.0005	0.11312	0.005	0.008
FH300	0.0004	0.09050	0.004	0.007
FH400	0.0003	0.06787	0.003	0.005
FL050	0.0032	0.72394	0.030	0.051
FL080	0.0013	0.29410	0.013	0.022
FL100	0.0009	0.20361	0.009	0.015
FL150	0.0006	0.13574	0.006	0.010
FL200	0.0003	0.06787	0.003	0.005
FL250	0.0002	0.04525	0.002	0.003

3 Pressure drop in psi obtained by multiplying value shown by actual gaseous flow rate desired (ACFM), ratio of viscosities actual<sub>cp</sub> , all divided by total filtration area (ft<sup>2</sup>) of element selected.  
0.018

4 Pressure drop in psi obtained by multiplying value shown by actual flow desired in gpm, viscosity of liquid in centipoise (if other than 1 cp), all divided by total filtration area (ft<sup>2</sup>) selected.

# Technical Data

## PMF High Pressure Segment Style Porous Metal Fiber Medium

### FS Series PMF Medium Removal Efficiency (in Microns)

Media Grade	Removal Ratings Liquid Service <sup>1</sup>				Nominal Thickness (in.)/(cm) <sup>2</sup>
	90%	98%	99%	100%	
FS025	0.5	0.8	0.9	2.5	.055/0.140
FS050	1.7	2.5	3	5	.046/0.117
FS075	2.5	4	5	7.5	.044/0.112
FS100	4.5	6	7	10	.043/0.109
FS150	6.5	8.5	10	15	.042/0.107
FS200	9	12	13	20	.042/0.107
FS300	14	18	19	30	.037/0.094

<sup>1</sup> Liquid removal efficiency ratings are based on a modified F2 test method and actual particle count data. The 98% removal values should be used when comparing PMF grades to other competitive fiber metal media.

<sup>2</sup> These thicknesses include upstream mesh and downstream support media which is required with all PMF FS Series medium.

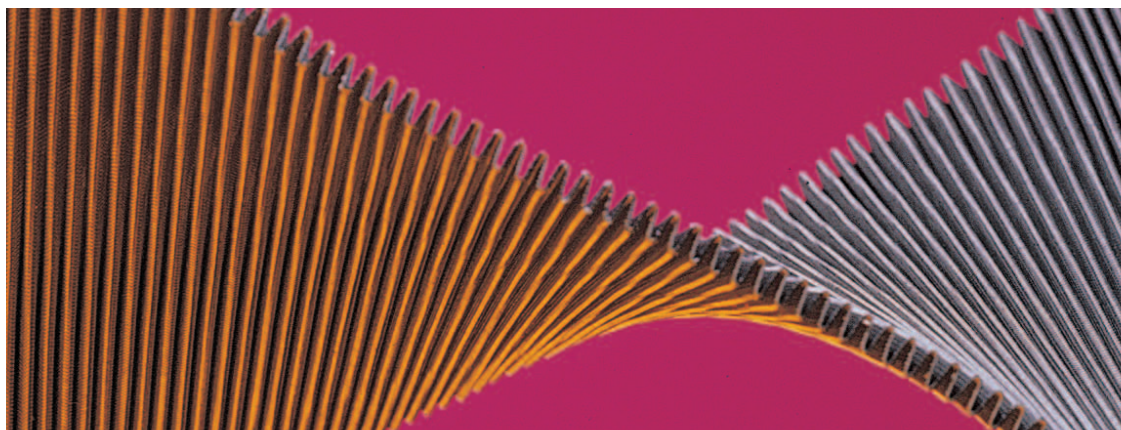
## Flow Characteristics

### PMF Medium

Grade	Clean Pressure Drop			
	Gaseous Service		Polymer Service	
	Air Permeability <sup>3</sup> psid-ft <sup>2</sup> /scfm	mbar-m <sup>2</sup> /m <sup>3</sup> /min	Polymer Permeability <sup>4</sup> psid-ft <sup>2</sup> /pph-poise	mbar-m <sup>2</sup> /kg/hr-poise
FS025	0.0123	2.78265	0.01025	0.145
FS050	0.0065	1.47051	0.00632	0.089
FS075	0.0048	1.08591	0.00422	0.060
FS100	0.0028	0.63345	0.00340	0.048
FS150	0.0022	0.49771	0.00159	0.022
FS200	0.0019	0.42984	0.00140	0.020
FS300	0.0006	0.13574	0.00062	0.009

<sup>3</sup> Pressure drop in psi obtained by multiplying value shown by actual gaseous flow rate desired (ACFM), ratio of viscosities actual/cp, all divided by total filtration area (ft<sup>2</sup>) of element selected.  
0.018

<sup>4</sup> The polymer permeability data are for filtration of Newtonian or near Newtonian polymer melts.



Pleated PMF Medium

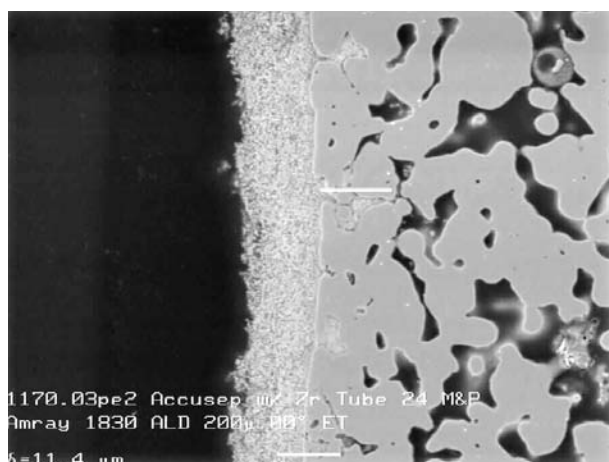
# AccuSep® Media

AccuSep filter media offers the same high permeability as Pall's S Series PSS® medium at a lower cost. AccuSep filters are more economical for many applications because they are manufactured as continuous length, seamless 48 or 96 inch long tubes, as opposed to shorter modules that are welded together. In addition, an AccuSep filter system can be smaller than other offerings, since more filter area can be packed into the vessel because of the small 1/2 " and 3/4 " tube diameters available.

Micron rating	Zirconia coated 316L stainless steel  Zirconia Coated Hastelloy X	Nickel	316L stainless steel (standard) 304 stainless steel 316 stainless steel Hastelloy X Inconel 600
0.1	x		
0.8		x	
2			x
5			x

## AccuSep Medium Standard Thickness

Tube Outer Diameter (Inches)/(cm)	Nominal Wall Thicknesses (Inches)/(cm)
0.47/1.19	0.018/0.046
0.72/1.83	0.025/0.064



0.1 micron Zirconia coated stainless steel AccuSep medium. The Zirconia layer is only available on the inside diameter of the tube.

## Applications

Various applications utilizing the coarser 2 and 5 micron grade media include:

### Chemical Petrochemical

- Catalyst activator/regenerator off – gas
- Filtering Industrial Gases
- Filtering Cryogenic fluids
- High temperature stack gas sampling
- Jet pulse blowback for the recovery of solids/catalyst
- Fluid bed reactor off gas systems in petrochemical plants and refineries
- Catalyst/solids recovery backwash systems

### Pharmaceutical/Food and Beverage

- Process and sterilizing steam filtration
- Beer and wine filtration
- Carbon/catalyst recovery from bulk pharmaceutical chemicals

Various applications utilizing the finer 0.1 and 0.8 micron grade media include:

- Crossflow filtration system for the recovery of catalysts or solids
- Membrane support for other functional coatings such as palladium, zeolites, catalysts, and carbon



# Technical Data

## AccuSep Medium Removal Efficiency (in Microns)

Media Grade	Removal Ratings	
	Liquid Service Rating	Gaseous Service Rating Based Upon Particle Count Data
C001	0.1 <sup>1</sup>	—
C008	0.8 <sup>2</sup>	—
C020	2.0 <sup>2</sup>	0.3 <sup>3</sup>
C050	5.0 <sup>2</sup>	0.5 <sup>3</sup>

1 Rating based upon a mean pore opening of 0.1 micron.

2 Rating based upon 99.98% removal efficiency by count. A modified F2 test method and actual particle count data is utilized.

3 Gaseous ratings are a >99.99% removal rating based upon extrapolation of liquid removal rating.

## Flow Characteristics

### AccuSep Medium

Media Grade	Clean Pressure Drop			
	Liquid Service		Gaseous Service	
	Aqueous Pressure Drop		Air Pressure Drop	
	(psi/gpm/sq ft)	(mbar/lpm/sq m) <sup>1</sup>	(psi/acfm/sq ft)	(mbar/cubic meter/min/sq meter) <sup>2</sup>
	0.5 Inch/12 mm OD Tube	0.75 inch/18 mm OD Tube	0.5 inch/12 mm OD Tube	0.75 inch/18 mm OD Tube
C020	0.62/1.05	0.86/1.45	0.084/18.99	0.116/26.45
C050	0.21/0.35	0.29/0.49	0.023/5.20	0.033/7.23

1 Pressure drop in PSID is obtained by multiplying value shown by the actual flow in gpm, viscosity of the fluid in centipoise and then dividing by the filter area deployed in sq ft.

2 Pressure drop in PSID is obtained by multiplying value shown by the actual gaseous flow in acfm, multiplying by the viscosity of the gas in centipoise and then dividing by 0.018. Then divide this value by the filter area deployed in sq ft.

# Applications and Markets

Pall supplies flat sheet and other media configurations, such as cut pieces, discs punched or machined from flat sheet material, and seamless cylinders. In addition, fabricated products, such as pleated cartridges, cylinders, and filtration systems employing metallic medium, are available. Pall and its subsidiaries have worldwide sales offices and factory trained distributors to address filter applications.

## Principal Applications and Markets:

### Pharmaceutical Manufacturing

- Biochemical and parenteral purification
- Crystal collection
- Steam filters

### Quench Diffusor in the Manufacture of Synthetic Fibers

### Gasoline and Heating Oil Manufacturing

### Computer Ink Jet Printing

### High Technology Battery Electrodes

### Instrumentation

- Chromatography
- Pressure regulators

### Wind Tunnels

### Fluid Flow Control

- Distributor plates
- Fluid bed dryers
- Distillation trays
- Fluidization support frits

### Polymer

- Film and fiber extrusion
- Polypropylene/Polyester Melt Filtration

### Chemical and Petrochemical Industries

- Industrial gases
- Cryogenic fluids
- High temperature stack gas sampling
- Catalyst recovery/bed protection

### Nuclear

- Radwaste
- Waste disposal systems

### Sparging

- Beverage manufacturing
- Fermentation
- Waste water treatment
- Many other applications which require a strong, temperature-insensitive filter medium for specific environments

We have the unique ability, aided by our extensive R&D resources, to produce special combinations of media, such as fiber metal coated S-Series PSS cylinders, PMM/Rigimesh composites, PMF/PMM composites, multi-layer sintered mesh composites, etc. With our manufacturing capabilities, we can create almost limitless combinations to meet specific application requirements.

For further details, contact:  
Pall at 888.873.7255.



*PSS High Temperature Gas Filters*



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

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