

## MEDIA GUIDE

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## INTRODUCTION

*PUROFLUX* is the right choice when it comes to having a more efficient, safe, and effective system. Please read this manual thoroughly and understand all safety related issues before attempting any work on the filter.

Following the guidelines listed in this manual, will help to insure the safety of all personnel which maintain the filter unit and related equipment. If there are any questions on the procedures or performance of the PF-10 series filters contact the local factory representative or call the factory direct at (805) 579-0216. **Do Not** operate the filter until all questions about operating procedures are answered by a qualified representative. This manual covers recommended procedures for installation and anchoring, start-up and shut down, and safety and maintenance. **NOTE:** All recommendations are minimums. The environment/operating conditions in which the filter unit is installed will dictate the frequency of scheduled maintenance.

## FLUID TREATMENT

Filtration is an effective way of reducing the level of suspended solids in a system, however, it is only one portion of a complete treatment program. Dissolved solids will not be removed from the system by media filtration. It is important to realize that the dissolved solids will concentrate, and can cause damage to a system. Furthermore airborne impurities and biological contaminants may be introduced into the system through the equipment being filtered. To control all potential contaminants, a treatment program must be employed by a competent professional. Such treatment should be initiated before the system start-up and continued regularly thereafter.

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# PUROFLUX CORPORATION

## MEDIA INFORMATION

**Please read the following information before charging the filter.**

- Before attempting any work on the *PUROFLUX* filter system make sure that all start-up and shutdown procedures listed in the **Operation and Maintenance Manual** are understood and followed. All work should be performed by qualified maintenance personnel. Shut off and lock-out all electrical power to the filter system before performing any work on the filter unit. Isolate the filter by closing all the service valves. **Always** wear/use proper equipment when working on, in or around the filter system.
- Before charging the filter unit, always inspect the internals and lining. If necessary remove the filter underdrain laterals and clean or replace. **Always** fill the filter vessel with water before loading media into the filter vessel. The water level should be a *minimum* of one (1) foot above the underdrain header or hub. This will help eliminate damage to the underdrain when the media is loaded into the filter vessel.
- The order in which the media layers are loaded is important. The media should be loaded in order of specific gravity (heaviest to lightest). For standard media packs the Support media (Filter Rock) always goes in first, followed by the Silica Sand media.
- Higher pressure vessels and ASME code vessels may require more Support Media (filter rock) than listed in the Operation and Maintenance Manual and the Media Manual, because these vessels may have deeper dished heads. The Inspection report sent with filter unit will show the exact amount to be installed.
- At *Puroflux's* discretion extra media may be shipped with the filter unit if the media is sent in bulk bags (this is to cover possible losses during shipping).
- *PUROFLUX* medias can be used in different combinations to enhance the performance and efficiency of filtration. Contact the local *PUROFLUX* representative or the *PUROFLUX* factory for more information regarding media usage.
- For application involving the use of Anthracite, Birm, or Activated Carbon media contact the local *PUROFLUX* representative or the *PUROFLUX* factory.

## **PUROFLUX MEDIAS**

*Puroflux* offers a wide range of media to satisfy a variety of filtration requirements. Each media is selected to provide uniform filtration and consistent performance. All medias provide uniform voids between each granule and layer; these voids offer high porosity and low flow resistance to facilitate consistent filtration ratings and an efficient backwash.

*Puroflux* medias can be used independently or in combinations to optimize filtration systems.

### **PUROFLUX MEDIAS:**

- **Silica Sand:** Uniformly grade silica sand used to remove suspended solids .5 micron and greater.
- **Garnet:** Almandite gemstone product, that filters down to 5 micron while maintaining excellent backwashing capabilities.
- **Filter rock:** Aggregate material used to provide a permeable support for the primary filtration media.
- **Anthracite:** Typically a pre-filter media to remove particles that would otherwise blind off finer filtration media (filtration down to 25 micron).
- **Birm:** Acting as an insoluble catalyst, this media enhances the reaction between dissolved oxygen and iron compounds within the effluent to offer efficient removal of dissolved iron.
- **Activated Carbon:** Typically used as a polish filter media to remove taste, odor and smell. Activated carbon can also be used for de-chlorination.

## **PACKAGING**

*Puroflux* packages filter and support media in 0.5 cubic foot drums (50 lbs each) for ease of handling and installation. For units 48" in diameter and larger the media will be packaged in 50# or 100 # bulk bags.

## **MEDIA INSTALLATION**

In an effort to eliminate damage to the filter's underdrain system during the loading process, fill the filter with water (approximately one (1) foot above the underdrain), before loading media. The water will reduce the force of the falling media as it is loaded from the top media port. Load the media in the order described on the data sheet taking care to distribute each layer of media evenly as it is loaded. **Refer to the applicable operation and maintenance manual for pre-loading checks and complete start up procedures.**

## SILICA SAND MEDIA

*Puroflux* Silica Sand medias are an extremely hard, whole grain crystalline silica. The media is both durable and dense, making it resistant to degradation during handling, backwashing, and extended use. The silica media is washed, dried, and screened under rigorous quality assurance control. The result is chemical purity, minimal clay and organic contamination, and consistent effective size and uniformity. Granule size is selected at a nominal .35 mm to .75 mm depending on filtration requirements. All *Puroflux* silica sand media's meet AWWA B-100, ANSI and NSF-61 standards for consistently uniform and chemically inert filter medias.

### Filtration Rating:

*Puroflux* Silica Sands offer a filtration efficiency of 90% removal by volume of particles .5 micron and larger when applied as specified.

### Flow and Backwash Characteristics:

*Puroflux* Silica Sand media may be used at flux of up to 20 GPM per sq.ft. and require a backwash flux between 15 and 20 GPM per sq.ft. for optimum performance. Lower influent flux rates will improve filtration however specified backwash flux rate must be maintained.

### ***Silica Sand Specification (.45 mm): Utilized for .5 micron filtration***

<u>Chemical Analysis</u>	<u>Mean Percent By Weight</u>
Silica Dioxide (SiO <sub>2</sub> )	99.74
Iron oxide (Fe <sub>2</sub> O <sub>3</sub> )	00.03
Aluminum Oxide (Al <sub>2</sub> O <sub>3</sub> )	00.10
Titanium Oxide (TiO <sub>2</sub> )	00.02
Calcium Oxide (CaO)	00.05
Magnesium Oxide (MgO)	00.01
Potassium Oxide (K <sub>2</sub> O)	00.01
Sodium Oxide (Na <sub>2</sub> O)	00.01

<u>Typical Properties</u>	<u>Test Method</u>	<u>Unit</u>	<u>Values</u>
Mineral	Petrographic	-	Quartz
Color	Visual	-	White
Hardness	Moh	-	≈7.0
Roundness		-	visual
Melting Point	ASTM C-24	°F	2930
Moisture Content	ASTM C-556	%	0.1
Specific Gravity	ASTM C-29		2.65
Bulk Density-Compacted	ASTM C-29	lbs/cu.ft.	98-100

**Silica Sand Specification (.55 mm): Utilized for 5 micron filtration**

Chemical Analysis Mean Percent By Weight

Silica Dioxide (SiO <sub>2</sub> )	99.480
Ferric Dioxide (Fe <sub>2</sub> O <sub>3</sub> )	00.060
Alumina Oxide (AL <sub>2</sub> O <sub>3</sub> )	00.210
Titanium Oxide (TiO <sub>2</sub> )	00.010
Calcium Oxide (CaO)	00.010
Magnesium Oxide (MgO)	00.010
Potassium Oxide (Ka <sub>2</sub> O)	00.130

Typical Properties Test Method Unit Values

Mineral	Petrographic	-	Quartz
Color	Visual	-	White
Hardness	Moh	-	≈7.0
Roundness	Krumbein	-	<.6
Melting Point	ASTM C-24	°F	2930
Moisture Content	ASTM C-556	%	0.1
Specific Gravity	ASTM C-29		2.65
Bulk Density-Aerated	ASTM C-29	lbs/cu.ft.	100

**Silica Sand Specification (.75 mm): Utilized for 10 micron filtration**

Chemical Analysis Mean Percent By Weight

Silica Dioxide (SiO <sub>2</sub> )	99.729
Ferric Dioxide (Fe <sub>2</sub> O <sub>3</sub> )	00.037
Alumina Oxide (AL <sub>2</sub> O <sub>3</sub> )	00.056
Titanium Oxide (TiO <sub>2</sub> )	00.008
Calcium Oxide (CaO)	00.023
Magnesium Oxide (MgO)	00.018

Typical Properties Test Method Unit Values

Mineral	Petrographic	-	Quartz
Color	Visual	-	White
Hardness	Moh	-	≈7.0
Roundness	Krumbein	-	<.9
Melting Point	ASTM C-24	°F	2930
Moisture Content	ASTM C-556	%	0.1
Specific Gravity	ASTM C-29		2.65
Bulk Density-Aerated	ASTM C-29	lbs/cu.ft.	92-95

## GARNET MEDIA

*Puroflux* Garnet media is a pure almandite gemstone product that is a chemically inert non-metallic mineral. Garnet is a homogenous mineral with no free chemicals. The Garnet is crushed and graded to exacting standards, followed by washing and drying with rigorous quality assurance control. The Garnet media is selected and sized to a nominal .55 mm

### Filtration Rating:

Garnet offers a filtration efficiency of 90% removal by volume of suspended solids 5 micron and larger when applied as specified.

### Flow and Backwash Characteristics:

Garnet may be used at flux of up to 20 GPM per sq.ft. and should be backwashed at a flux of 20 GPM per sq.ft. for optimum performance. Lower influent flux rate will improve filtration results however, specified backwash flux rates must be maintained.

### Specification:

Typical Chemical composition	Mean Percent by Weight
Iron Oxide (Fe <sub>2</sub> O <sub>3</sub> )	30
Manganese Oxide (MnO)	2
Aluminum Oxide (AL <sub>2</sub> O <sub>3</sub> )	26
Silicon Dioxide (SiO <sub>2</sub> )	38
Magnesium Oxide (MgO)	2
Calcium Oxide (CaO)	2

Physical Profile: Podecahedrons with occasional Trapezohedrons

Hardness: 7.5 on Moh scale

Specific gravity: 4.0 - 4.1

Free Silica: None

## **SUPPORT MEDIA (Filter Rock)**

*Puroflux* Support Media is an aggregate fill material graded to nominal 4.75 mm size and utilized in most of the PF-20, 30, 40, and 50 series filters to offer an appropriate support for the filtration media and underdrain system within the filter. The Support Media enhances the backwash operation by providing a uniform distribution of water through the media bed.

### Specification:

*Puroflux* Support Media is comprised of nominal 1/4" x 1/8" filter rock and contains no free chemicals.

## **ANTHRACITE MEDIA**

*Puroflux* Anthracite Media is a graded anthracite product sized at 1.2 mm. Anthracite is used typically as a pre-filter media providing increased capacity for filter applications involving large volumes of contaminant that would otherwise blind off other filter medias. Anthracite granules are angular and irregularly shaped, forming large voids between granules. The large voids increase porosity and removal capacity, while reducing pressure losses through the media bed.

### **Flow and Backwash Characteristics:**

Anthracite may be used at flux up to 20 GPM per sq.ft. and should be backwashed at flux of 10-15 GPM per sq.ft for optimum performance. Lower influent flux rates will improve filtration results however specified backwash flux rates must be maintained.

### Specification:

Property	Unit	Value
Density	lbs/cu.ft.	50
Hardness	Moh	3.1
Specific Gravity	-	1.6

## **BIRM MEDIA**

*Puroflux* Birm Media is an effective and economical method of removing dissolved iron and/or manganese from water. Birm is a granular filter media manufactured and graded to a nominal .61 mm. The physical characteristics of the Birm provide an excellent filter media which is easily cleaned by backwashing. Birm is not consumed in the iron removal operation.

Ground water supplies in many cases contain various amounts of calcium, magnesium, iron manganese, sodium and silica. In most common ground waters the dissolved iron is usually a ferrous bicarbonate caused by an excess of free carbon dioxide and is not filterable (the dissolved iron remains in solution as a carbonate, at or above 7 pH). Birm acts as a catalyst between the oxygen and soluble iron compounds to enhance this reaction and to produce ferric hydroxide which precipitates and can be easily filtered.

### **Effluent Requirements**

When utilizing Birm for an iron removal application, it is necessary that the water contains no oil or hydrogen sulphide. Organic matter should not exceed 4-5 ppm and the dissolved oxygen content must equal at least 15% of the iron content with a pH of 6.6 or more. Water having a low D.O. level may be pre-treated by aeration to gain the required D.O. levels. If the influent water has a pH of less than 6.5 dissolved chemicals such as soda ash may be used to raise the pH. If the organic solids exceed 4-5 ppm, pre-filtration down to 10 micron will be required.

### **Flow and Backwash Characteristics**

Birm may be used at a maximum flux of 5 GPM per sq.ft and should be backwashed at flux rates of 10-15 GPM per sq.ft. for optimum performance. Lower influent flux will enhance the oxidation reaction however specified backwash flux rates must be maintained. If Birm is used for manganese removal, the water should have a pH of 8.0 to 9.0 with a D.O. level of 15% of the total manganese content.

#### Specification:

Property	Unit	Value
Density	lbs/cu.ft.	47-50
Color	Visual Black	
Uniformity Coefficient	-	1.72

## ACTIVATED CARBON MEDIA

*Puroflux* Activated Carbon Media is granular activated carbon specially produced with the capability of removing taste, odor and smell, as well as organic matter from water. Activated Carbon can also be used for dechlorination where required. Made from selected coal which is compacted, milled, sized and thermally steam activated to yield a strong, dense product; Activated Carbon granules contain a large surface area. The pore structure is carefully controlled throughout the activation process to facilitate absorption of both high and low molecular weight organic impurities.

Flow and Backwash Characteristics:

Activated Carbon may be used at a maximum flux rate of 5 GPM per sq.ft. and should be backwashed at a flux rate of 5 GPM per sq.ft. for optimum performance. Lower influent flux rates (i.e. longer contact time) will improve the adsorption characteristics of Activated Carbon.

### Specification:

Typical Properties:	Unit	Value
Size	MM	1.06 nominal
Iodine Number	MG/GM	1000 minimum
Abrasion Number	RO-TAP	70 minimum
Mean Particle Dia	MM	0.9 - 1.1
Moisture (as packaged)	%	2 max.
Total Surface Area	N2BET Method	1100 m2/G
Apparent Density	GM/CM3	0.45 nominal
Particle Density Wetted (H2O)	GM/CM3	1.35
Uniformity Coefficient	-	1.8 max.
Ignition Temp.	°C	480-520

**CAUTION:** WET ACTIVATED CARBON DEPLETES OXYGEN FROM AIR. WHENEVER WORKERS ENTER A VESSEL CONTAINING CARBON, ALL PRECAUTION MUST BE TAKEN SINCE DANGEROUSLY LOW LEVELS OF OXYGEN MAY BE ENCOUNTERED. ATMOSPHERE SAMPLING AND WORK PROCEDURES FOR POTENTIALLY LOW OXYGEN AREAS SHOULD BE FOLLOWED.

## Filter Media Capacity/Flow Tables

Table 1: PF-10 Series Filter Media Capacities and Flow Rates

Puroflux Model (Size)	Support Media (1/2 cu.ft.)	Silica Media (1/2 cu.ft.)	Influent Flow (GPM)	B/W Flow (GPM)
PF-1020	0	5	43	43
PF-1024	0	7	63	63
PF-1030	0	12	98	98

Table 2: PF-20 Series Filter Media Capacities and Flow Rates

Puroflux Model (Size)	Support Media (1/2 cu.ft.)	Silica Media (1/2 cu.ft.)	Influent Flow (GPM)	B/W Flow (GPM)
PF-2012	1	1	15	15
PF-2018	2	2	35	35
PF-2024	3	5	65	65
PF-2030	4	5	100	100
PF-2036	7	10	140	140
PF-2042	14	13	190	190
PF-2048	14.5	15	250	250

Table 3: PF-30 Series Filter Media Capacities and Flow Rates

Puroflux Model (Size)	Support Media (1/2 cu.ft.)	Silica Media (1/2 cu.ft.)	Influent Flow (GPM)	B/W Flow (GPM)
PF-3012	1	1	15	15
PF-3018	2	2	35	35
PF-3024	3	5	65	65
PF-3030	4	5	100	100
PF-3036	7	10	140	140
PF-3042	14	13	190	190

PF-3048	14.5	15	250	250
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### Filter Media Capacity/Flow Tables

Table 4: PF-40 Series Media Capacities and Flow Rates

Puroflux Model (Size)	Support Media (cu.ft.)	Filter Media (cu.ft.)	Influent Flow (GPM)	B/W Flow (GPM)
PF-4024	2	4.5	65	65
PF-4030	3	7	100	100
PF-4036	5	9.5	140	140
PF-4042	10.5	18	195	195
PF-4048	14.5	23	250	250
PF-4054	19	29	310	310
PF-4060	24	36	390	390
PF-4066	30	43.5	475	475
PF-4072	39	49.5	565	565
PF-4078	47	58	665	665
PF-4084	55.5	67	770	770
PF-4090	65	77	885	885
PF-4096	84	105	1000	1000

Table 5: PF-50 Series Filter Media Capacities and Flow Rates (5 micron standard)

Puroflux Model (Size)	Support Media (1/2 cu.ft.)	Filter Media (1/2 cu.ft.)	Influent Flow (GPM)	B/W Flow (GPM)
PF-5012	1	1	15	15
PF-5018	2	2	35	35
PF-5024	3	5	65	65
PF-5030	4	5	100	100
PF-5036	7	10	140	140
PF-5042	14	13	190	190
PF-5048	14.5	15	250	250

## **FILTER MEDIA OPTIONS**

### *Mixed Medias:*

A variety of medias may be utilized to target specific requirements. When utilizing a mixed media the order in which it is loaded is very important. Each media is layered by specific gravity with the heaviest media (highest specific gravity) at the bottom and the lightest at the top. This will reduce the amount of media mixing during backwash cycles. Changes in media usages/styles may affect the flux and vessels side shell heights or diameters. For mixed media bed usages consult your *Puroflux* representative or *Puroflux* direct.

### *Lower Micron Ratings*

Standard .5 and 5 micron media utilize the same amounts of silica sand media as the 10 micron media shown in the charts 1, 2, 3, & 4. Consult your *Puroflux* representative or *Puroflux* direct for information regarding the use of finer filtration medias.

Note: The PF50 series filters are equipped standard with the 5 micron silica media pack.

## **SAFETY**

All electrical, mechanical, and rotating machinery are potential hazards. It is important to be familiar with the design, construction, and operation of all equipment before performing any work. Always use adequate safeguards (including use of protective clothing where necessary or required) whenever installing, operating, or working on the equipment.

Care should be taken when working on, near, or around this equipment. Appropriate safeguards must be established to prevent the personnel and/or public from injury and to prevent damage to the equipment, affiliated system, and premises.

It is important to be thoroughly familiar with the equipment, associated system, controls, and the procedures set forth in this manual. Only qualified personnel should operate, maintain, and repair this equipment. Always follow proper procedures and use the correct tools, when handling, lifting, installing, operating, maintaining, or repairing the equipment. This will aid in the prevention of personal injury and/or property damage.

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