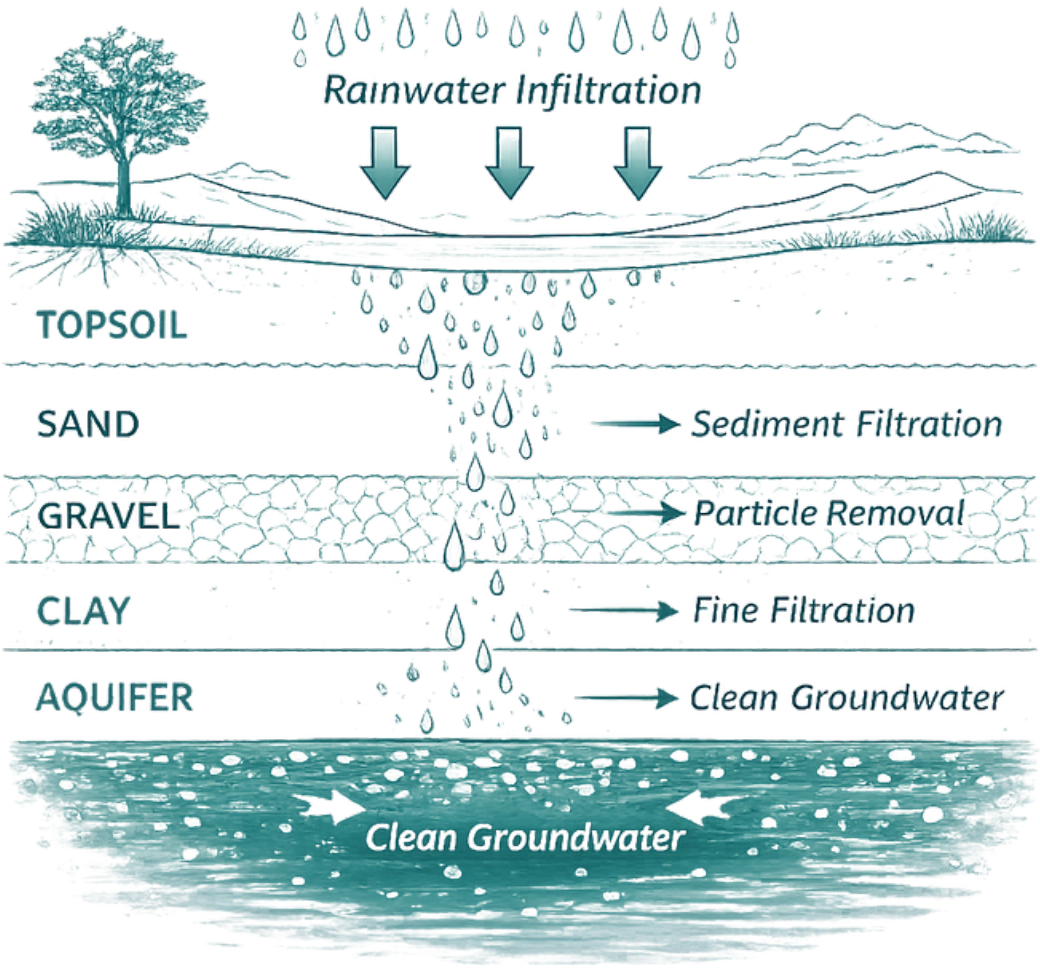
PUROFLUX CORPORATION

Filter Media Guide

Technical Reference for Installation, Operation & Maintenance



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Introduction

Natural Filtration. Engineered Protection.

Water can appear perfectly clear while still carrying thousands of microscopic particles that impact system performance. The human eye can only detect particles approximately **20 microns or larger**, meaning many contaminants remain completely invisible.

Human Eye
Detects particles
≥ 20 microns

Typical Contaminants
10-50 microns in
cooling systems

Drinking Water
15-20 microns -
often invisible

For perspective:

- A human hair measures roughly 70 microns
- Many suspended solids in cooling water systems range from 10–50 microns
- Drinking water can contain particles in the 15–20 micron range, often undetectable without proper filtration

Although invisible to the eye, these particles have a measurable impact on mechanical systems.

Fine particulates can accumulate within heat exchangers, cooling tower fill, valves, strainers, and small passages, gradually reducing heat transfer efficiency and restricting flow. Over time, this buildup contributes to:

- Fouling
- Scaling
- Increased energy consumption
- Premature equipment wear
- Reduced system reliability

Even small concentrations of suspended solids can significantly increase **operating costs and maintenance requirements.**

For facilities operating cooling towers, closed-loop hydronic systems, or industrial water systems, managing suspended solids is essential to maintaining consistent performance. Clear water does not necessarily mean clean water, and the particles that cannot be seen are often the ones that create the greatest operational challenges.

The Puroflux Solution

Puroflux separators are engineered to continuously remove suspended solids from water systems, capturing particles across a wide range of sizes — including those well below the threshold of human visibility.

By separating and removing these particles before they accumulate within critical equipment, Puroflux systems help:

- Protect heat exchangers and cooling tower components
- Maintain heat transfer efficiency
- Extend equipment life
- Reduce maintenance requirements
- Improve overall system reliability

For engineers, operators, and facility managers, effective filtration is not simply about improving water clarity — it is about protecting system performance. By continuously separating particles that would otherwise remain suspended and invisible, Puroflux technology helps ensure water systems operate efficiently, reliably, and with greater longevity. Puroflux is the right choice when it comes to achieving a more efficient, safe, and effective water system.

Safety & Operation

Please read this manual thoroughly and understand all safety-related information before attempting any work on the filter.

Following the guidelines outlined in this manual will help ensure the safety of personnel responsible for maintaining the filter unit and related equipment.

If you have any questions regarding procedures or performance of **Puroflux media filters**, please contact your local factory representative or call the factory directly at: **(805) 579-0216**. Do not operate the filter until all questions regarding operating procedures have been addressed by a qualified representative.

This manual provides recommended procedures for:

- Installation and anchoring
- System start-up and shutdown
- Operation and maintenance
- Safety guidelines

NOTE:
All recommendations provided are minimum guidelines. Environmental and operating conditions will determine the appropriate maintenance frequency.

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System Fundamentals

Fluid Treatment

Filtration is an effective method for reducing the level of suspended solids in a system; however, it is only one component of a complete treatment program. Dissolved solids will not be removed from the system by media filtration. It is important to recognize that dissolved solids will concentrate over time and may cause damage to the system.

In addition, airborne impurities and biological contaminants may be introduced into the system through the equipment being filtered. To control all potential contaminants, a treatment program should be implemented by a qualified professional. Such treatment should begin prior to system start-up and continue on a regular basis thereafter.

Media Information

Please read the following information before charging the filter.

- Before performing any work on the PUROFLUX filter system, ensure that all start-up and shutdown procedures outlined in the Operation and Maintenance Manual are fully 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 service valves. Always wear and use proper safety equipment when working on, in, or around the filter system.
- Before charging the filter unit, inspect the internals and lining. If necessary, remove the filter underdrain laterals and clean or replace them. Always fill the filter vessel with water before loading media into the vessel. The water level should be a minimum of one (1) foot above the underdrain header or hub. This helps prevent damage to the underdrain when the media is loaded into the filter vessel.
- The order in which the media layers are loaded is important. Media should be loaded according to specific gravity, from heaviest to lightest. For standard media packs, the support media (Filter Rock) is loaded 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 or the Media Manual, as these vessels may have deeper dished heads. The inspection report provided with the filter unit lists the exact amount required.
- At PUROFLUX's discretion, additional media may be shipped with the filter unit when media is supplied in bulk bags. This accounts for possible material loss during shipping.
- PUROFLUX media can be used in different combinations to enhance filtration performance and efficiency. Contact your local PUROFLUX representative or the PUROFLUX factory for more information regarding media selection and usage.

- For applications involving anthracite, Birm, or activated carbon media, contact your local PUROFLUX representative or the PUROFLUX factory for guidance.

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 inches in diameter and larger, the media will be packaged in 50 lb or 100 lb bulk bags.

Installation and Safety

To help prevent damage to the filter underdrain system during the loading process, fill the filter vessel with water prior to loading the media. The water level should be approximately one (1) foot above the underdrain.

The water helps reduce the impact of falling media as it is loaded through the top media port. Load the media in the order specified on the data sheet, taking care to distribute each layer evenly across the filter bed as it is installed.

Refer to the applicable Operation and Maintenance Manual for required pre-loading checks and complete start-up procedures.

All electrical, mechanical, and rotating equipment presents potential hazards. Personnel should be familiar with the design, construction, and operation of all equipment before performing any work. Always use appropriate safeguards when installing, operating, or servicing equipment. This includes the use of proper personal protective equipment (PPE) where required.

Care should be taken when working on or around this equipment. Appropriate safety measures must be in place to protect personnel and the public from injury, and to prevent damage to the equipment, associated systems, and surrounding property.

Operators and maintenance personnel must be thoroughly familiar with the equipment, system controls, and the procedures outlined in this manual. Only qualified personnel should install, operate, maintain, or repair the equipment.

Always follow proper procedures and use the correct tools when handling, lifting, installing, operating, maintaining, or servicing the equipment. Adhering to these guidelines will help prevent personal injury and property damage.

Media Types

Silica Sand Media

PUROFLUX silica sand media are 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 controls. The result is chemical purity, minimal clay and organic contamination, and consistent effective size and uniformity. Granule size is selected within a nominal range of **0.15 mm to 0.75 mm**, depending on filtration requirements. All PUROFLUX silica sand media meet **AWWA B100, ANSI, and NSF-61 standards** for consistently uniform and chemically inert filtration media.

Filtration Rating

PUROFLUX silica sand provides the following filtration efficiencies when applied as specified:

- **0.5 micron**: 50% removal of particles by count and 80% removal of particles **2.0 microns and larger.**
- **5 micron**: 90–95% removal of particles by volume.
- **10 micron**: 90–95% removal of particles by volume

Flow and Backwash Characteristics

PUROFLUX silica sand media may be operated at flux rates of up to **20 GPM per sq. ft.** and require a backwash flux between **15 and 20 GPM per sq. ft**. for optimal performance. Lower influent flux rates will improve filtration performance; however, the specified backwash flux rate must be maintained. In instances where the required backwash flux cannot be achieved, a longer backwash duration is recommended.

Specification 1 - 0.15–0.20 mm · 0.5-Micron Filtration

Chemical Analysis — Mean Percent by Weight

Chemical Analysis	Mean Percent By Weight
Silica Dioxide (SiO_2)	99.74
Iron Oxide (Fe_2O_3)	00.03
Aluminum Oxide (Al_2O_3)	00.10
Titanium Oxide (TiO_2)	00.02
Calcium Oxide (CaO)	00.05
Magnesium Oxide (MgO)	00.01
Potassium Oxide (K_2O)	00.01
Sodium Oxide (Na_2O)	00.01

Physical Properties

Typical Properties	Test Method	Unit	Value
Mineral	Petrographic	-	Quartz
Color	Visual	-	White
Hardness	Moh	-	7.0
Roundness	Visual	-	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

Specification 2 - 0.65 mm · 5-Micron Filtration

Chemical Analysis — Mean Percent by Weight

Chemical Analysis	Mean Percent By Weight
Silica Dioxide (SiO_2)	99.480
Ferric Dioxide (Fe_2O_3)	00.060
Alumina Oxide (Al_2O_3)	00.210
Titanium Oxide (TiO_2)	00.010
Calcium Oxide (CaO)	00.010
Magnesium Oxide (MgO)	00.010
Potassium Oxide (K_2O)	00.130

Physical Properties

Typical Properties	Test Method	Unit	Value
Mineral	Petrographic	-	Quartz
Color	Visual	-	White
Hardness	Moh	-	7.0
Roundness (Krumbein)	-	-	<0.6
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

Specification 3 - 0.75 mm · 10-Micron Filtration

Chemical Analysis - Mean Percent by Weight

Chemical Analysis	Mean Percent By Weight
Silica Dioxide (SiO_2)	99.729
Ferric Dioxide (Fe_2O_3)	00.037
Alumina Oxide (Al_2O_3)	00.056
Titanium Oxide (TiO_2)	00.008
Calcium Oxide (CaO)	00.023
Magnesium Oxide (MgO)	00.018

Physical Properties

Typical Properties	Test Method	Unit	Value
Mineral	Petrographic	-	Quartz
Color	Visual	-	White
Hardness	Moh	-	7.0
Roundness (Krumbein)	-	-	<0.9
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 **almandine gemstone product**, classified as a chemically inert, non-metallic mineral. Garnet is a homogeneous mineral containing no free chemicals. The garnet is crushed and graded to exacting standards, then washed and dried under rigorous quality assurance controls. The garnet media is selected and sized to a nominal **0.55 mm.**

Filtration Rating

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

Flow and Backwash Characteristics

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

Specification:

Chemical Composition - Mean Percent by Weight

Compound	% by Weight
Iron Oxide (Fe_2O_3)	30%
Manganese Oxide (MnO)	2%
Aluminum Oxide (Al_2O_3)	26%
Silicon Dioxide (SiO_2)	38%
Magnesium Oxide (MgO)	2%
Calcium Oxide (CaO)	2%

Physical Properties

Property	Value
Physical Profile	Predominantly dodecahedral crystals
Hardness	7.5 (Mohs scale)
Specific Gravity	4.0-4.1
Free Silica	None
Nominal Size	0.55mm

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: Nominal 4.75 mm (1/4" × 1/8") filter rock. 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:

Physical Properties

Property	Unit	Value
Density	lbs/cu.ft.	50
Hardness	Moh	3.1
Specific Gravity	-	1.6
Nominal Size	-	1.2 mm
Operational Flux	GPM/sq.ft	Up to 20
Backwash Flux	GPM/sq.ft.	10-15

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:

Physical Properties

Property	Unit	Value
Density	lbs/cu.ft.	47-50
Color	Visual	Black
Uniformity Coefficient	-	1.72
Nominal Size	-	0.61 mm
Operational Flux (max)	GPM/sq.ft	5
Backwash Flux	GPM/sq.ft.	10-15

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:

Physical Properties

Property	Unit	Value
Nominal Size	mm	1.06
Iodine Number	mg/g	1000 min.
Abrasion Number (RO-TAP)	-	70 min.
Mean Particle Diameter	mm	0.9 - 1.1
Moisture (as packaged)	%	2 max.
Total Surface Area (N_2 BET)	m^2/g	1100
Apparent Density	g/cm^3	0.45
Wetted Particle Density (H_2O)	g/cm^3	1.35
Uniformity Coefficient	-	1.8 max.
Ignition Temperature	°C	480 - 520
Operational Flux (max)	GPM/sq.ft.	5
Backwash Flux	GPM/sq.ft.	5

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.

System Performance

Media Capacity PF-10/20/30

Table 1: PF-20-FG (Fiberglass) 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-2024FG	0	6	65	65
PF-2030FG	0	14	100	100
PF-2036FG	0	18	140	140

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	6	5	100	100
PF-2036	9	10	140	140
PF-2042	14	13	190	190
PF-2048	26	36	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	6	5	100	100
PF-3036	9	10	140	140
PF-3042	14	13	190	190
PF-3048	26	36	250	250

Media Capacity PF-40/50

Table 4: PF-40 Series 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-4024	4	9	65	65
PF-4030	6	14	100	100
PF-4036	10	19	140	140
PF-4042	21	36	195	195
PF-4048	29	46	250	250
PF-4054	38	58	310	310
PF-4060	48	72	390	390
PF-4066	60	87	475	475
PF-4072	78	99	565	565
PF-4078	94	116	665	665
PF-4084	111	134	770	770
PF-4090	130	154	885	885
PF-4096	168	210	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.)	Silica 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	5	5	65	65
PF-5030	9	5	100	100
PF-5036	14	10	140	140
PF-5042	22	13	190	190
PF-5048	36	32	250	250

Note: Contact Puroflux for older PF-10 series media replacements. Please have Puroflux job or PO number from unit to confirm vessel requirements.

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.

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