Filtration Products

Design Guide

The Intelligent Use of Water.®

Introduction to Landscape Filtration

Water Sources and Flow

The reduction of clean fresh water sources available for irrigation presents a demanding challenge. Water supplies are less stable now than in years past and using reclaimed or other lower quality water sources is becoming more the norm.

Irrigation systems can become clogged with dirt, debris and other contaminants pulled in from a water source. Nozzles, rotors, valves and other equipment can become blocked and even damaged, resulting in higher flow rates and more water use to offset lost capacity.

The use of alternative water supplies creates a need to remove contaminants such as algae, sand, silt, pollen, bugs, scale, rust, mussels, suspended solids and microbiological growth from water before it can be used for irrigation.

Rain Bird Filter Products

Rain Bird Corporation's commitment to the Intelligent Use of Water® has led us to develop filtration products capable of maximizing use of changing water supplies. Rain Bird offers products such as pump suction screens, automatic self-cleaning screen filters, disc filters, centrifugal sand separators, and sand media.

Our products are regularly used in irrigation applications for filtration of water from reservoirs, rivers, wells, irrigation ponds and other water sources.

Algae

Asian Clams

Fish

Zebra Mussels

Sticks/Leaves

Sand/Silt

Water Sample Analysis

Send us a one liter sample of water and we'll run a test for total suspended solids (TSS). The test helps us determine an appropriate filter size for the application.

- Sample(s) must be taken so as to represent a water sample as close as possible before it enters the filter.
- Sample(s) should be labeled properly.

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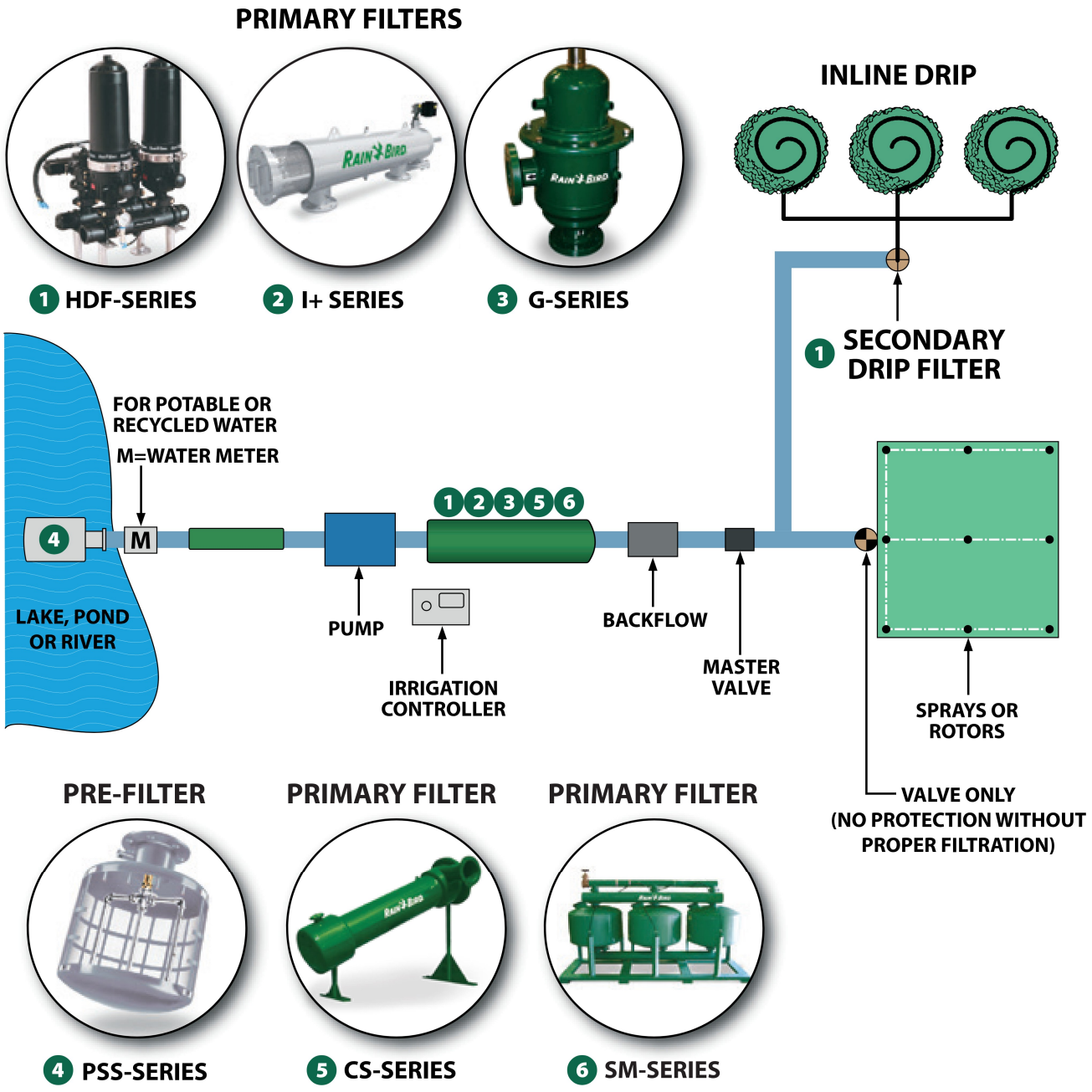
For more filtration information, please call 877-648-9532 or email filters@rainbird.com

www.rainbird.com

Filtration Layout for Landscape Irrigation

Dirty water can come from potable and reclaimed water, lakes, ponds, streams, rivers, surface water, wells and reservoirs. The water can be contaminated with sand, silt, leaves, fish, sticks, paper and floating solids. These sources have increased the need to filter and pre-filter the intake water, to avoid causing problems for equipment.



Filter Options Guide

It's important to choose the right filtration for each application.

High water quality will assure that your irrigation system functions at optimum levels.

Filtration Options						
Filter Type	**Particulate Removal**	**Degree of Filtration**	**Economic Size**	**Installation / Operation**	**Maintenance**	**Total Cost of Ownership**
Automatic Hydraulic Suction Scanning Screen Filter	Very High: Flush water volume is low and flush time is fast (4 to 20 sec.)	40-1000µ	500 - 7250+ GPM (136.4 - 1977.5 m^3/hr)	Easy, automatic operation does not interrupt system flow during rinse cycle.	Low	Best
Disc Filters	Very High: Low flow rate flush. Discs provide depth filtration.	50-400µ	50 - 800+ GPM (13.6 – 218.2 m^3/hr)	Easy, dual canister (or more) are required for uninterrupted operation.	Low	Best
Automatic Electric Suction Scanning Screen Filter	Very High: Flush water volume is low and flush time is fast (6 to 20 sec.)	40-1000µ	500 - 7250+ GPM (136.4 - 1977.5 m^3/hr)	Easy, automatic operation does not interrupt system flow during rinse cycle.	Higher	Better
Sand Media	Very High: Flush water volume is large and flush time can be very high - as much as 10 min or more.	75µ (Multi Media to 10µ) Flow Sensitive*	50 - 3500+ GPM (13.6 - 954.6 m^3/hr)	Dual tanks (or more) are required for uninterrupted operation.	Requires periodic media changes	Better
Centrifugal Sand Separator	High: Batch or continuous low flush water	Captures down to 75µ level. Cannot filter algae and is flow sensitive*	10 - 8300 GPM (2.7 - 2264 m^3/hr)	Easy, Suitable for full- time operation.	Low to high, dependent on water quality and manual vs auto purge.	Better
Pump Suction Screen	Low: (high for large particles) - prevents debris from entering pump	12 Mesh (1,680µ)	200 - 4000 GPM (54.5 - 1091 m^3/hr)	Easy, Suitable for full- time operation.	Low	Best

Rain Bird Filtration Products

Rain Bird offers products such as pump suction screens, automatic self-cleaning screen filters, disc filters and centrifugal sand separators. Products are regularly used in irrigation applications for filtration of potable and reclaimed water from reservoirs, rivers, wells, irrigation ponds and other water sources.

Controllers

Rain Bird control systems provide flexibility and dependability. Our uniquely designed systems allow cleaning cycles to occur without interruption of flow to the system. The controllers are designed to automatically initiate backwashing by elapsed time, pressure differential or manual activation.

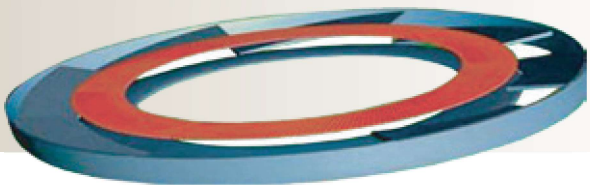
Disc Filters

HDF-Series

- Perfect for 50 - 800 GPM (15.6 - 218.2 m^3/hr) and higher applications
- Ideal for both surface and well water containing both organic and inorganic materials
- Patented anti-clogging device reduces backwash frequency and duration
- Polypropylene manifolds eliminate corrosion and rust concerns.
- Pre-assembled and pre-wired, requiring only inlet and outlet connections.
- Easy to maintain

Anti-Clogging Device

The device generates a helical centrifuge effect, which moves away from the disc a high percentage of particles suspended in water. Achieving the optimal performance results in water savings and low maintenance.



Hydraulic Suction Scanning Filters

Powered by line water pressure, simple Rain Bird filter controller automatically backflushes on differential pressure, preset time or manually. Filtration surface debris is removed until every square inch is 100% clean.

Customization Options

Rain Bird's complete line of filtration systems can be customized with manifolds and filter connections to fit existing piping.

G-Series

- Perfect for 2" to 6" (DN 50 to DN 150) applications
- Polyester powder coated carbon steel and Stainless Steel options
- Space saving vertical configuration
- Effective hydraulically powered backwash
- Low backflush volume

I-Series

- Perfect for 4" to 14" (DN 100 to DN 350) applications
- Polyester powder coated carbon steel and Stainless Steel options
- Horizontal Configuration
- Effective hydraulically powered backwash
- Low backflush volume

Filtration is the single most effective way to increase irrigation system performance and minimize maintenance caused by dirty water.

Pump Suction Screen

PSS-Series

- Attaches to intake line to remove gross solids from the water source
- Powered by line water pressure
- Self cleaning, fully automatic operation
- Made of galvanized steel

Centrifugal Sand Separator

CS-Series

- Prevents damage to system pumps and equipment caused from clogging
- Centrifugal separation of abrasive sand, rock, grit and other inorganic contaminants
- Sand removal efficiency of 98% of solids down to 75µ (200 mesh)
- Operates within flow range defined in Tech Spec
- Simple operation (no electricity required)
- Manual purge operation (automatic purge optional)

Sand Media Filter

SM-Series

- Efficient sub 100 micron filtration solution
- Fully Automatic
- Available in Coated Carbon Steel and Stainless Steel
- Skid mounted and Ground Mounted designs
- Multi-Media upgrade options for finer and specific filtration needs

Filter Selection Guidelines

Select a water filter based on the specific requirements of the application.

1. **Determine if the water source is filamentous or non-filamentous.**
   - Disc, screen or media filters are appropriate for filamentous applications.
   - Sand separators will not work with filamentous debris.
2. **Micron Requirements for the Application**

Rule of Thumb: Design a system for the finest possible micron requirement.

» Drip tape (80µ)
» Emitters (100µ)
» Micro-sprinklers (130µ)
» Micro jets (130µ)
» Impact sprinklers (300µ)
» Spray heads (200µ)
» Valves (130µ)
» Drip irrigation (100µ)
» Gear & rotor (200µ)
» Golf Rotors (300µ)
» Mussel & clam control (40-80µ), very special – consult Rain Bird

3. **Amount of Suspended Solids in Water**

Rule of Thumb: Design a system that can accommodate worst-case conditions if the water quality changes.

Water Quality			
Quality	**TSS**	**Example**	**De-rating Multiplier**
GOOD	< 20 mg/L (ppm)	Well Water	N/A
AVG.	< 40 mg/L (ppm)	Clear Lake Water	0.85
POOR	< 80 mg/L (ppm)	River Water	0.50
BAD	< 110 mg/L (ppm)	Brown or green water (mud or heavy algae)	0.35
For water quality values above 110 ppm, please consult factory for custom recommendations.			

For example: A 6" filter rated for 1000 GPM with 100 micron with "good" quality water should be sized to accommodate 500 GPM. of "poor" quality water.

4. **Line size (in inches)**
   » Design for existing or planned line size.
5. **Flow rate minimum and maximum GPM**

Rule of Thumb: Choose a filter that is properly sized to accommodate a greater water flow than the system is expected to require.

6. **Physical Space Available**
   » Choose vertical or horizontal orientation to accommodate service clearance requirements.
7. **Minimum/Maximum Operating Pressure (PSI)**
   » Each filter type has a minimum and maximum rated pressure for operation.

NOTE: Self-cleaning filters must maintain minimum operating pressure while the filter's flushing mechanism is engaged. System pressure is necessary to initiate a rinse cycle and clean the filters screen.

Filter Types		
Type	**Min Pressure (PSI / Bar)**	**Max Pressure (PSI / Bar)**
HDF Disc Filters	50 / 3.4	140 / 9.5
G-Series Filters	40 / 2.7	150 / 10.2
I and E-Series Filters	40 / 2.7	150 / 10.2
Sand Media	40 / 2.7	80-150 / 5.4-10.2*

* Depending on application requirements

NOTE: If minimum operating pressures are not available, please consult your Rain Bird representative.

For filter sizing and selection assistance, call us at 877-648-9532 or send an email to filters@rainbird.com

De-Rating Filters Based on Water Quality

Rule of Thumb: Well water contains inorganic debris such as sand, while pond or surface water contains largely organic matter such as algae and leaves. The water source and debris load must be taken into consideration when sizing a filter (de-rating).

Each size and type of filter has an upper limit to the particle loading it can handle. This will vary somewhat depending on the size of the particles in the water and the concentration of those particles at various sizes.

A review of the water's PSA or TSS determine the solids level and de-rating required. Particle size, concentration and total volume will dictate the solids reduction that can be achieved with any given screen size.

Additional Tips And Considerations

Operating Pressure

- The inlet pressure should never drop below the recommended minimum discharge PSI.
- During normal filtration, the inlet pressure should never be below the filters recommended minimum operating pressure to allow for a pressure drop when the rinse valves are open (more flow demand = lower pressure).
- Higher inlet pressures than the recommended minimum helps guarantee ideal rinsing conditions.
- A pressure gauge should be installed on the inlet port and outlet port of a filter to read pressure during the rinse cycle.

Reverse Osmosis (R/O) Water and High Chloride content water sources

- Filtration of R/O water sources requires special consideration. Standard construction materials (including SS) typically require upgrading. Additionally, high chloride content water sources can attack standard construction materials (including SS) and typically require upgrading as well. Water tests including Chloride and Free Chlorine levels are recommended to ensure proper materials are used.

Controlled Outlet Valves

- A Controlled Outlet Valve (COV for short) is a valve located downstream of the filter which is controlled by the filter to shut during the rinse cycle. The valve is used in instances where the filter does not have the minimum pressure required for both the rinse cycle and downstream consumption.
- The minimum required pressure for each filter model that Rain Bird sells is listed on the Tech Spec sheet. The valve can be actuated by any of several methods hydraulically, electrically or pneumatically.

Bypass Manifolds

- A manual bypass is recommended for applications where a constant flow of water is required downstream during filter servicing.
- The valve is normally a manually actuated valve, such as a butterfly valve or similar. The manual valve is always recommended when installing a by-pass series unit.
- Since the by-pass is integral to the filter body, the automatic by-pass will also be isolated during servicing. Note: inlet and outlet isolation valves are also required for manual bypass mode.

Opening Flush Valve to Atmosphere

- The drain line connected to the rinse valve should be attached, according to the following conditions:
- In all cases, the drain lines or header (4" or greater) must be drained to atmosphere with no restriction. The addition of back pressure on the rinse valve drain lines will reduce filter efficiency.
- A 4" line should be utilized after the ball valve.
- Piping run should preferably not exceed 30 feet.
- Piping should not include more than two (2) 90° elbows.
- Piping should be installed level or pitch down to avoid back pressure on the flush valve or gravity will take over and not allow filter cleaning during backwash.
- Piping should never discharge below water level in a body of water.
- The open end of piping should be securely mounted to avoid fluttering during rinse cycle.

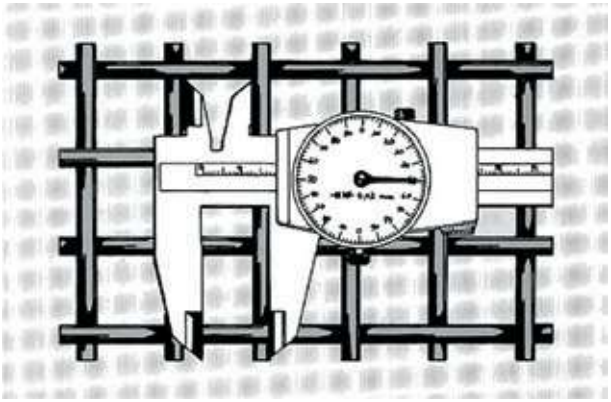
Filtration Term Definitions

Filamentous

A fine or very thin thread or fiber: filaments of cloth, or flax. These materials could be algae, paper fines, etc.

Micron/Mesh

- **Micron:** Actual size of holes (lower number is finer screen). Typically used to refer to fine pump discharge filters.
- **Mesh:** Number of holes per one inch length of screen (higher number is finer screen). Typically used to refer to coarse pump inlet filters.



Mesh/Micron Conversion						
Mesh	Micron	Inch		Mesh	Micron	Inch
4	5205	0.2030		80	177	0.0070
8	2487	0.0970		100	149	0.0059
10	1923	0.0750		120	125	0.0049
14	1307	0.0510		140	105	0.0041
16	1000	0.0394		170	88	0.0035
20	840	0.0331		200	74	0.0029
25	710	0.0280		230	62	0.0024
30	590	0.0232		270	53	0.0021
35	500	0.0197		325	44	0.0017
40	420	0.0165		400	37	0.0015
45	350	0.0138		550	25	0.0009
50	297	0.0117		800	15	0.0006
60	250	0.0098		1250	10	0.0004
70	210	0.0083		*****	5	0.00002

Particle Size Analysis (PSA)

A particle size measurement that determines the size range, and/or the average, or mean size of the particles in a water sample. The particle size can have considerable importance in the sizing of a filter.

Particle Size Distribution (PSD)

A measurement designed to determine the size and range of particles of a material.

Parts Per Million (PPM)

This is a way of expressing the concentration of something in water. So parts per million or ppm means out of a million in the water. One ppm is equivalent to 1 milligram per liter of water (mg/l).

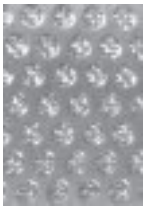
Pressure Differential (PD or DP)

The pressure difference that exists between points (inlet/out). It is measured in pounds per square inch (PSI).

Total Suspended Solids (TSS)

The dry-weight of particles trapped by a filter. It is a water quality parameter used for example to assess the quality of source water.

Types of Filter Screens Available

Stainless Steel Screen options		
	Woven on PVC Support	Multi-layered Sintered
Screen Patterns		
Hydraulic Collapse D.P.	300 PSI	300 PSI
Temp Rating	150 °F	300 °F
Material	St/St 316L	St/St 316L

The Intelligent Use of Water.™

LEADERSHIP • EDUCATION • PARTNERSHIPS • PRODUCTS

At Rain Bird, we believe it is our responsibility to develop products and technologies that use water efficiently. Our commitment also extends to education, training and services for our industry and our communities.

The need to conserve water has never been greater. We want to do even more, and with your help, we can. Visit www.rainbird.com for more information about The Intelligent Use of Water.™

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