The Complete Guide to Removing Sediment From Well Water

Effective Solutions for Sediment in Well Water

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How to Remove Sediment From Well & Spring Water

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Clean Water Made Easy.

Well or spring water can be loaded with sediment, clogging valves, fixtures, and irrigation systems and ruining water heaters and appliances. Although sediment cartridge filters are widely available at hardware stores, these filters are often poorly sized or use the wrong type of filter for the type of sediment that is in the water. The result is often pressure drop, reduced flow rate and frequent maintenance.

Minimize maintenance and pressure loss by choosing the correct filter for your type of sediment.

There are five main type of sediment filters that are most useful for well and spring water:

- Spin-down filter strainers & Y-strainers
- Centrifugal separators
- Cartridge filter systems
- Backwashing media filters
- Ultra-Filtration (UF) membrane systems

Spin-down filter strainer

Cartridge filter systems

Centrifugal separator

Questions to Ask When Choosing a Sediment Filter:

- What type of sediment do I have in my water system?
- What is the flow rate in gallons per minute that I want to filter?
- What is my line pressure in PSI?
- Which type or combination of types of filtration should I use?
- Do I have sub-micron sediment or turbidity that cannot be filtered out by standard filters and requires ultra-filtration or flocculation combined with filtration?

Backwashing sediment filter

UF membrane system

Clean Water Systems has served many thousands of satisfied customers worldwide since 1985. We are dedicated to providing our customers high quality water treatment systems at the lowest cost.

Test Your Water

It might look like sediment by the time you see it in the toilet bowl or laundry, but often what we think of as sediment is actually dissolved metals such as iron or manganese that turn to a solid particle only after they have entered the household plumbing. A basic water analysis is always a good idea when determining which type of sediment filter is best for your needs.

A general mineral analysis will provide a list of the common minerals. Important items to test for include:

- pH
- Hardness (calcium carbonate)
- Iron
- Manganese
- Total dissolved solids

Water test kits can be used on-site, giving immediate results. A mail-in sample bottle is available to send to our lab for additional tests.

Stains and Odors

If water is discolored, or has a strong odor, you may also want to test for:

- Iron Bacteria
- Tannin
- Hydrogen sulfide

Professional Analysis or Home Test Kit?

If you are trying to remove sediment or eliminate iron, manganese or odors, it is recommended to try a home test kit first, as they are easy to use and very effective. The EPA recommends testing your water annually for coliform bacteria and nitrate.

To find a local lab, consult your county health department for recommendations.

The water sample should be drawn as close to the source as possible, before any filtration systems.

Laboratory analysis water test kit. Contains freeze pack with special bottles for sending by overnight UPS or Fed Ex to the lab. Extensive analysis for bacteria, general mineral, metals and chemicals are available for relatively low cost.

Perform a "Toilet Tank Inspection"

Unless it is new or has recently been cleaned, your toilet flush tank can be a wealth of useful water quality information! Simply lift the cover and look in.

Symptom	Cause	Solution
White scale on float	Calcium hardness	Water softener
	Total dissolved solids	Reverse osmosis
Tank sides are white, but black, rust or sand is laying on the bottom	Decaying galvanized pipes	Replace pipes; correct corrosiveness of water
	Sand, rust or sediment in well water	Sediment and/or iron filter
Blue stains	Acidic (low pH) water	Calcite neutralizer or soda ash feeder
Rust stains	Iron	Iron filter (Birm, MangOX, Greensand, Pyrolox)
Furry, stringy red growths	Iron (and/or other) bacteria	Chlorination, aeration, ozone injection, hydrogen peroxide, followed by filtration
Furry, stringy gray or black growths	Sulfur (or other) bacteria	Chlorination, aeration, ozone injection, hydrogen peroxide, followed by filtration
Frothy, with bubbles	Iron bacteria	Chlorination, aeration, ozone injection, hydrogen peroxide, followed by filtration
Brown stains	Iron and/or Manganese	Iron filter that removes manganese (MangOX, Greensand, Pyrolox)
Black stains	Iron and/or Manganese	Iron filter that removes manganese (MangOX, Greensand, Pyrolox)
	Ferric Sulfide (black rust)	Iron filter (Birm, MangOX, Greensand, Pyrolox)
Pink stains	Airborne bacteria	Not water quality related; Clean with chlorine bleach

Check For Sediment in Water Heater

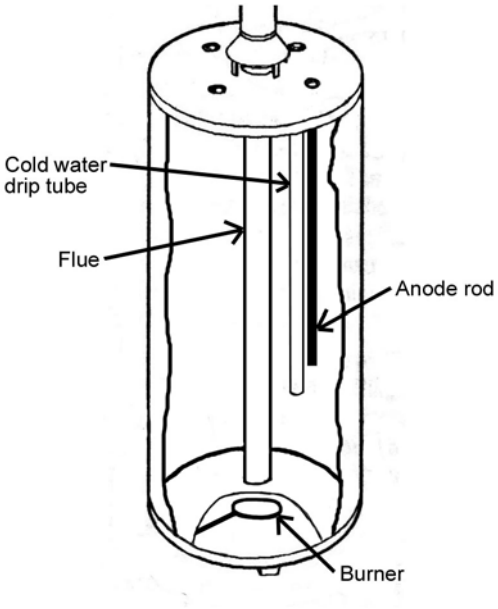
Water heaters can not only trap sediment, but can actually create and introduce sediment into your water.

Common forms of sediment introduced by the water heater:

Type of Sediment	Caused By
Blue or gray chips	Decaying dip tube
Black or sandy sediment	Decaying glass liner
Black, orange or gray flakes	Decaying anode rod

It is recommended that you drain your water heater at least once per year. Not only is this quick and easy to do, it will flush out sediment that may accumulate in the bottom and give you an idea of your sediment's type and color, if sediment is present.

Connect a garden hose to the bottom drain on your water heater and open the valve and run the water into a white 5 gallon bucket.



Water heaters can accumulate sand, rust, and sludge. If the water heater is corroding, "sediment" can actually be introduced into the water.

Check for Pipe Corrosion and Scale Build-up

Your pipes can introduce sediment into your water if they are corroding. Unless your home is new, it is important to check for pipe corrosion and scale build-up. Fortunately, this is not difficult to do using one of the following methods:

- Check for signs of blue stains in fixtures and in toilet tanks (which can indicate copper corrosion) and/or test water for copper.
- If you have galvanized iron pipe, look for signs of rust and rust-colored scale in the toilet flush tank.
- If possible, inspect the exterior of pipes and valves, to see if you see any signs of pinhole leaks or corrosion by-products which can be crusty, bluish, white, salty-looking, or rusty. If you are having any plumbing work done on your house, inspect any sections of the pipes that have been cut to see if there is any scale build-up or signs of corrosion.

Determine Your Well Pump Flow Rate

Your well pump can pump water up to a certain maximum flow rate, in gallons per minute. For example say you could fill a 5 gallon bucket in 1 minute. This is a flow rate of 5 gallons per minute or 5 GPM. If the water filled up a 5 gallon bucket in 30 seconds, the flow rate would 10 GPM. Knowing how many gallons per minute your water system can pump is critical to picking the right type of water treatment system—luckily, it is easy to determine.

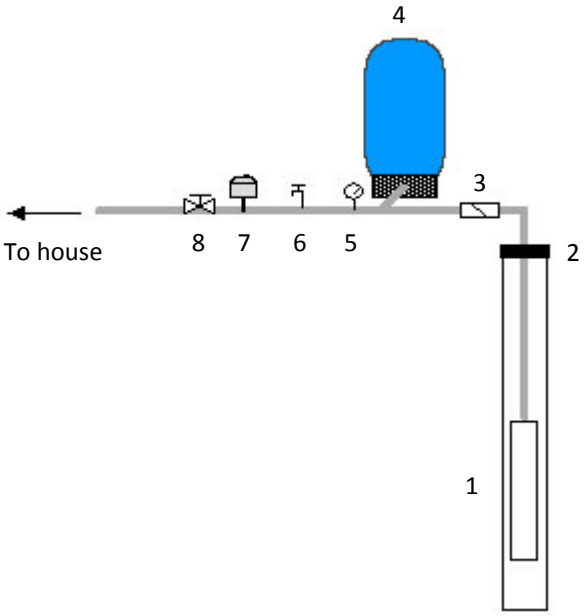
This method works for most well pumps. If your pump turns on at one pressure (typically 30 or 40 PSI) and off at a higher pressure (usually 50 or 60 PSI) this method will work for you. All you need is a 1 or 5 gallon bucket and a clock or timer:

1. Open any hose bib or faucet until pump turns on.
2. Close hose bib or faucet and let pump fill up pressure tank until it turns off.
3. Using a 1 or 5 gallon bucket, open faucet and collect and measure all water discharged until pump turns on.
4. When pump turns on, immediately close faucet and start timing pump cycle*
5. When pump turns off, record pump cycle time to refill pressure tank in seconds.
6. Divide the number of gallons collected in Step 3 by the number of seconds in Step 5.
7. Multiply the answer from Step 6 by 60.
8. The answer in Step 7 is the average pumping capacity of the pump in gallons per minute (GPM).

***Systems with Variable Speed ("Continuous Pressure Pumps")**
Note: some well pumps are known as "continuous pressure pumps." They don't turn on at one pressure and off at another. These types of pumps are "variable speed," meaning that they run slow at first, and then faster as the pressure drops in the pipes. For continuous pressure systems, you need to consult with the pump installer or look at the pump's documentation to see what your flow rate is.

Pressure Tank with Submersible Well

How It Works: Submersible pump in well (1) is controlled by pressure switch (7). When pressure in pressure tank (4) drops below a preset level (typically 30 or 40 PSI) the pressure switch turns on well pump. Well pump continues to run until pressure in pressure tank builds up, and pressure switch reaches maximum pressure setting. The pressure tank contains a pre-charged air bag to moderate pressure in the piping system.



1 Well pump submerged in water

2 Well head with sanitary seal

3 Check valve (may be submerged in well and not visible)

4 Pressure tank

5 Pressure gauge

6 Hose bib

7 Pressure switch

8 Gate valve

Sediment, Flakes and Particles Identification Chart

Flakes or Particles	Cause	Possible Remedy
Black flakes, grit	Lining of water heater deteriorating	Replace water heater
Black grit or particles	Manganese	Greensand filter or MangOX filter
	Iron sulfide (“black rust”)	Chlorination with iron filtration
	Corrosion from lining of galvanized pipe	Replace galvanized pipe with copper or plastic pipe
Blue chips	Water heater dip tube deteriorating	Replace water heater
Blue or green flakes	Copper-stained calcium particles from copper pipe corrosion	Check pH of water and neutralize acid pH
Dirt color sediment	Sediment from well water	Sediment backwash filter, or cartridge type filter; ultrafiltration
Gray sand or grit	Sand or dirt from well water	Sediment backwash filter, or cartridge type filter
	Water heater liner deteriorating	Replace water heater
Red, yellow or orange beads	Water softener resin from broken water softener	Repair or replace water softener
Rust, orange flakes	Rust and iron from well water	Sediment backwash filter, and/or iron filter
	Iron bacteria	Chlorination with iron filtration
	Rust from corroded iron pipes	Replace corroded iron pipes
Sand or grit	Sand from well	Sand separator or Spin-Down filter strainer
White or tan flakes	Clay or calcium particles from well water	Sediment filter
	Calcium carbonate (water hardness)	Water softener
White plastic chips	Water heater dip tube deteriorating	Replace water heater
Gray particles suspended in water	Colloidal clay	Ultrafiltration (UF) membrane

Sediment Filter System Types:

- **Mesh screen "spin-down" filter strainers:** 100 to 500 micron range, remove sand and larger sediment
- **Centrifugal separators:** 40 microns and up, remove large sand and sediment
- **Micron cartridge filters:** 0.5 to 100 micron range, remove fine sediment and grit
- **Sediment backwash filters:** filter down to 5 to 10 micron range and are self-cleaning. Often used in conjunction with 1 to 5 micron cartridge filters.
- **Ultrafiltration membranes (UF):** filter down to less than 0.15 microns. Remove bacteria, very fine colloidal sediment

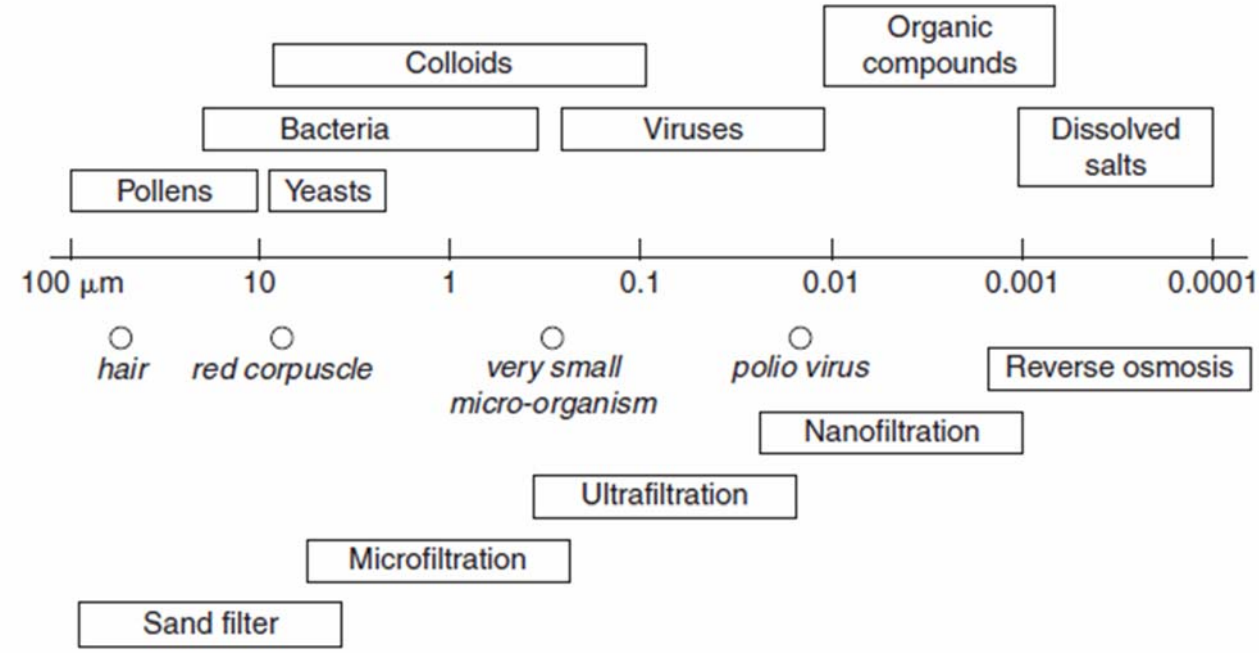
Sediment backwash filter followed by 1 micron filter and water softener. Removes sediment and iron and softens water.

What is a micron? A micron is a measurement of particle size: it is one-millionth of a meter or one twenty-five thousandth of an inch.

A human hair is approximately 50 to 100 microns in diameter. Bacteria range in size from approximately 10 microns down to less than 1 micron. Most large sediment (such as grit, flakes and small particles) that enters homes from wells is in the range of 1 to 200 microns.

Two-stage big blue filter for home. First stage is 50 micron, second state is dual -grade 25/1 micron filter.

Particle Size Chart



Filter Strainers with Mesh Screens

Spin Down Filter Strainers

Spin down filters use screens of varying sizes to remove large sediment and grit from water. A typical practical size for home water wells is either 60 (250 microns) or 100 (150 microns) mesh.

Spin-down filter with PVC flush valve

Spin-down filter with auto-flush valve and timer

Wye (Y) Strainers

A wye strainer has an internal screen with a large 20 mesh screen. It is used to keep large sand or foreign objects out of piping systems. A hose bib or valve can be installed on the screen "Y" section to allow flushing of the strainer.

Mesh Size to Micron Chart

Sieve Mesh #	Inches	Microns	Typical Material Removed
14	0.055	1400	Flakes , mica chips
20	0.033	841	Beach sand
60	0.009	250	Fine sand
100	0.005	150	Sediment
200	0.002	74	Rust flakes
325	0.00	44	Clay
400	0.001	37	Silt

What does mesh size mean? Figuring out mesh sizes is easy. All you do is count the number of openings in one inch of screen (in the United States, anyway). The number of openings is the mesh size. So a 4-mesh screen means there are four little squares across one linear inch of screen. A 100-mesh screen has 100 openings, and so on. As the number describing the mesh size increases, the size of the particles decreases. Higher numbers equal finer material.

How fine do screens get? That depends on the wire thickness. If you think about it, the finer the weave, the closer the wires get together, eventually leaving no space between them at all. For this reason, beyond 325-mesh particle size is usually described in "microns."

What is a micron? A micron is a measurement of particle size. A micron is one-millionth of a meter or one twenty-five thousandth of an inch.

Why use a 50 micron filter cartridge? Why not use just a 50 micron strainer instead? Normally for well water systems, we do not recommend filter strainers less than about 200 mesh or 74 microns. The strainers can become clogged too quickly. Its better to use filter strainers for large sediment such as sand or grit. Filter cartridges and backwash filters have larger surface areas and don't become clogged and cause pressure loss like very fine mesh strainers will.

Centrifugal Separators

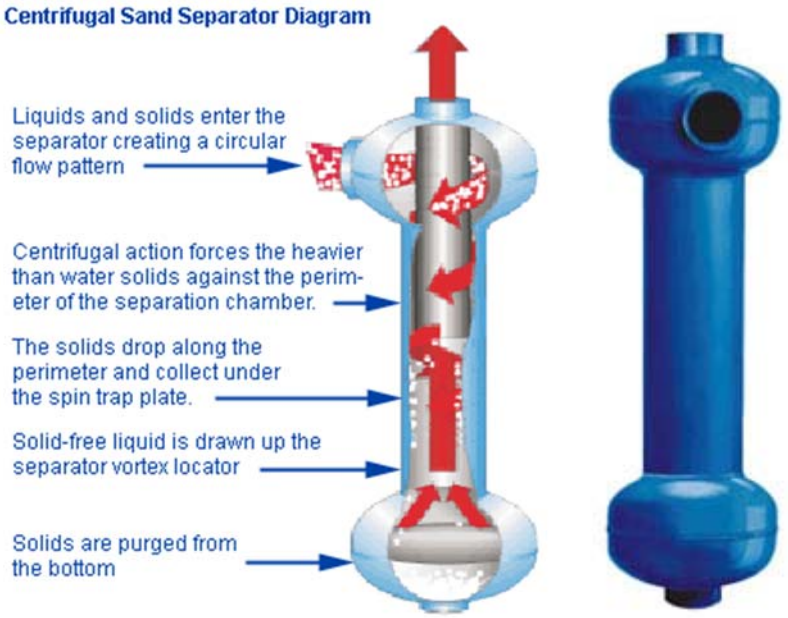
In a centrifugal sand separator, the water rushes through the device and centrifugal force slings large particles, sand, debris and sludge outward to the separator wall and downward in a spiral motion.

Gravitational force pulls the separated solid particles downward past the spin trap plate into the solids holding chamber. Cleaned water then rises through the vortex locator and returns back to the plumbing system.

These systems have no screens, slotted baffles, moving parts, or filter media, so there is no pressure loss.

No maintenance is required, although periodic opening of the purge valve is necessary to flush out accumulated solids. Purging can be done manually or with an automatic flush valve.

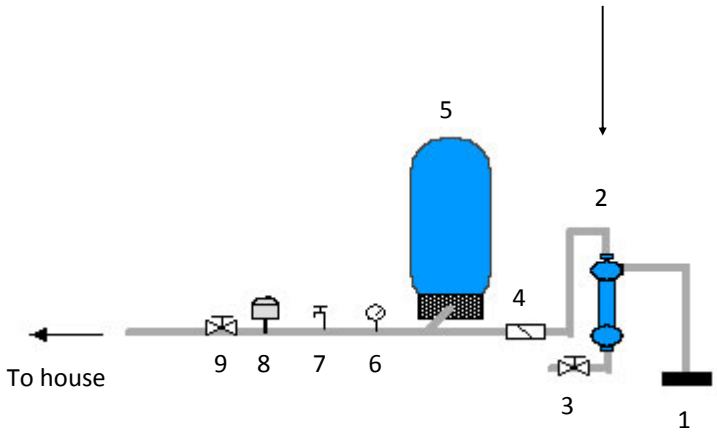
Centrifugal separators can remove 98% of particles 40 microns and up.



How It Works: Submersible pump in well (1) is controlled by pressure switch (8). When well pump runs, water flows through centrifugal separator and solids are separated out.

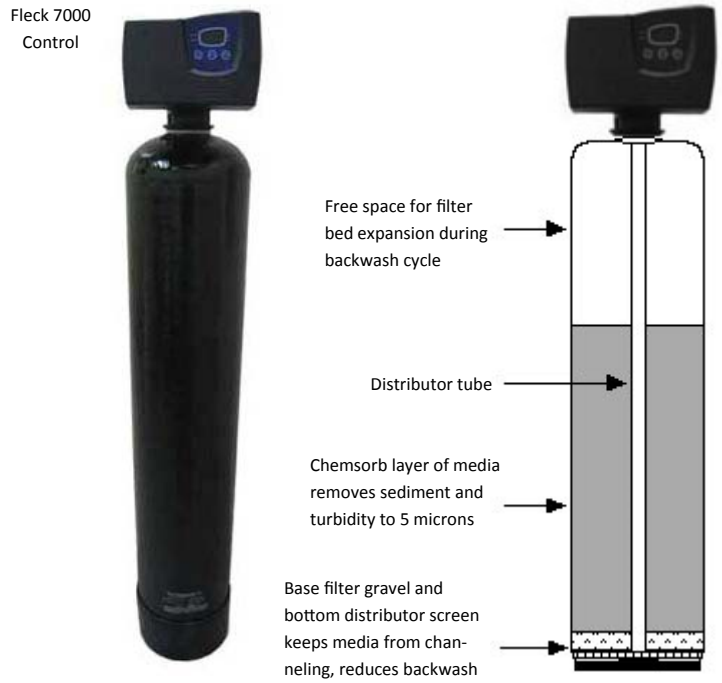
1. Well head
2. Centrifugal separator
3. Manual flush valve
4. Check valve
5. Pressure tank
6. Pressure gauge
7. Hose bib
8. Pressure switch
9. Gate valve

Install centrifugal separator at the point where flow rate in gallons per minute is greatest. For home water wells, the separators are usually installed before the pressure tank to take advantage of the greatest flow.



Sediment Backwash Filters

- Remove sediment and turbidity with no filter cartridges or maintenance
- Natural zeolite mineral filters water to 5 micron range
- Auto backwash & rinse keeps media clean
- Little or no pressure drop through filter
- Rugged media lasts for years
- Lighter than sand but filters finer
- Lower backwash flow rate requirements than traditional sand filters



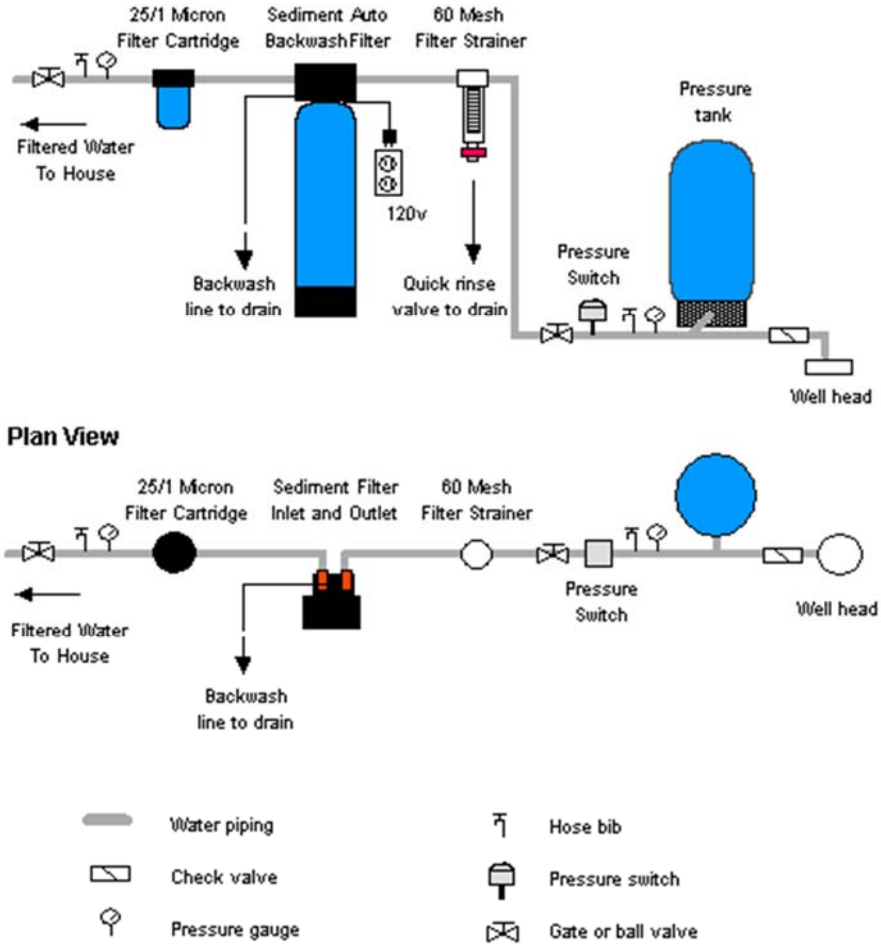
3-Stage Sediment Removal

How it Works:

Water first flows through filter strainer removing sand, large sediment, and flakes. An optional auto-flush valve keeps filter mesh screen clean, or it can be manually flushed by opening bottom flush valve.

Next the water flows through the automatically backwashing sediment filter where most of the turbidity and sediment is removed down to 5 microns. Accumulated sediment is automatically flushed out to drain restoring water pressure.

After the sediment backwash filter, the water is further filtered, removing all particles larger than 1 micron.



Micron Cartridge Filters

Filter cartridges are widely used in home water systems and come in a variety of sizes and micron ratings. A micron rating of 50 microns, for example, means that approximately all particles 50 microns in size and up will be trapped by the filter.

Big Blue Housings use 4.5” x 10” or 4.5” x 20” filter cartridges and are popular low cost whole house filters.

PLEATED

- Sizes in 1 to 100 microns
- Durable polyester
- Resistant to bacteria
- Resistant to chemicals
- Large surface area
- High flow rates
- Washable & reusable

STRING WOUND

- Sizes in 1 to 75 microns
- Economical polypropylene
- String wound design
- High dirt holding capacity
- Low cost
- Not washable or reusable

DUAL GRADE

- Sizes in 1 to 75 microns
- Economical polypropylene
- Dual–grade pre filter + inner filter for maximum dirt holding capacity of all filters
- Higher flow rate than standard string wound filters
- Not washable or reusable

CERAMIC

- Available in 10” big blue
- Filters to 0.9 microns
- Chemical resistant
- Removes *Giardia* cysts
- Washable and reusable
- 8.5 GPM flow rate

Stainless Steel Housings for large homes and commercial applications. These housings can meet the desired flow rate while minimizing pressure drop.

Multi-Stage Big Blue Housings can be mounted together on brackets to create 2 and 3 stage filter systems. A typical array is 50 micron pre-filter, followed by 5 or 1 micron second or third filter.

A typical home well water treatment system. Backwashing filter system on right removes sediment to 5 microns, followed by 1 micron big -blue filter and water softener on left.

Ultra-Filtration Membrane Systems

Some particles are smaller than 1 micron and cannot be removed by conventional micron filter cartridges. These sub-micron particles can cause water to be cloudy or discolored, or to harbor bacteria.

An ultra-filtration or "UF" membrane system filters water down to less than 0.015 microns, effectively removing bacteria, cryptosporidium cysts, and very fine sediment and colloidal clay particles.

The result is crystal clear water with no bacteria or sediment.

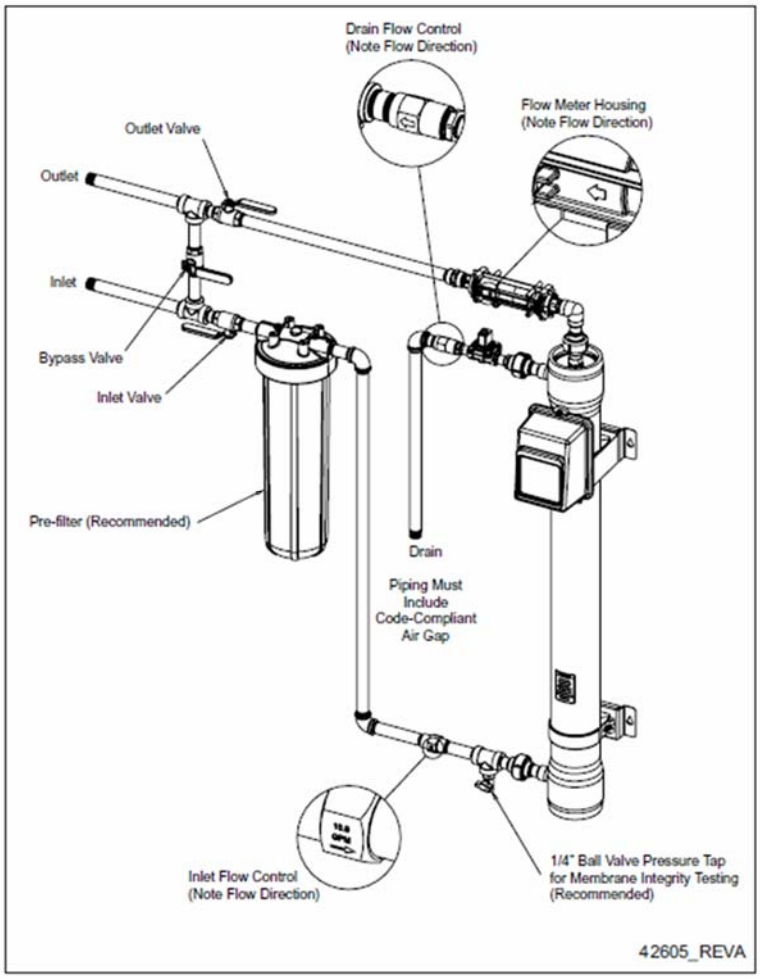
Pentek© UF membrane with auto-flush valve

UF Systems

- Remove all particles down to the 0.020 to 0.015 micron range.
- Remove turbidity, cysts and bacteria
- Use hollow-fiber membrane that is cleaned by simple backwashing
- Require normal line pressure to operate
- Retain natural minerals—UF systems do not desalinate
- Pre-filter water to 1–5 microns before UF

Antunes© UF system with filtration

Typical UF installation, installed after pre-filtration

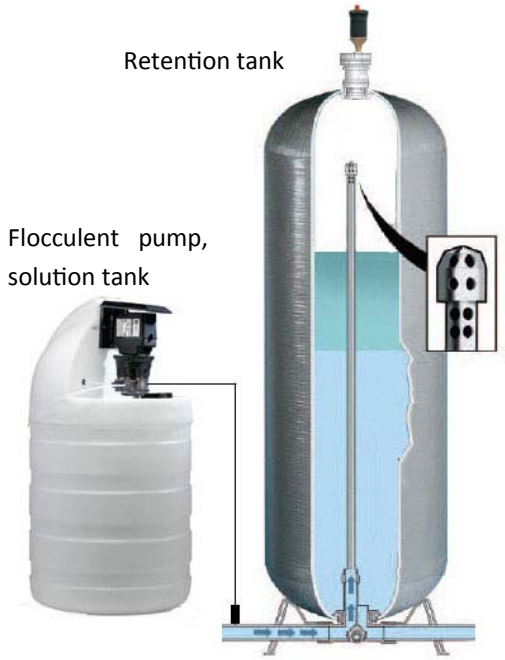


Flocculation Aids

Some natural waters contain tannin, organic matter, color and/or super fine particles called colloids that cannot be completely removed through filtration without prior pretreatment with a flocculent. After the non-toxic chemical is injected, it combines with these fine colloidal particles to form 'floc', which is a larger mass of these particles. The floc is then easily filtered out with auto-backwashing sediment filters or cartridge filter systems.

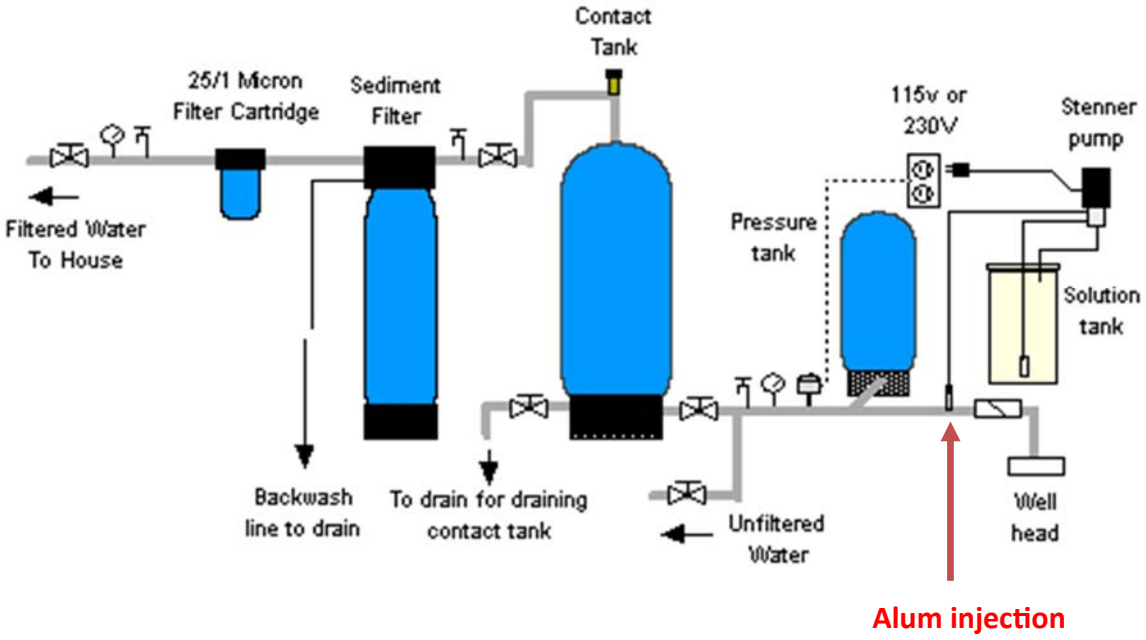
Common Flocculants Include:

- Alum (aluminum sulfate)
- Ferrous sulfate
- Chitosan (from crustaceans)
- Alginates



Flocculants are pumped as a liquid and injected with small metering pumps. A retention tank is used to allow time for the reaction to occur prior to filtration.

Residential Well Water Flocculation and Filtration System



Identify Pipe Sizes

It is useful to know the size of your incoming pipes. For instance, say you decide you want to install a cartridge filter or a sediment backwash filter system for your house. They come in different pipe sizes, such as ¾" pipe, 1" pipe etc. Generally, you want to make certain you get a system that will not restrict the water flow or pressure, so if you have a 1" pipe, you would want an iron filter that has 1" pipe connectors.

It is easy to check the size of your pipes. First, check on the pipe itself, often it will be labeled or written on the side. If not, use a string to determine your pipe's circumference (the distance around the pipe).

String Method

Remove any insulation from the pipe. Using a piece of string about 6" long (or a cloth tape measure) wrap the string around the pipe once and measure to the nearest 1/8 of an inch. Once you have found the circumference, use the chart to the right to find your pipe or tube size.

Pipe Circumference to Pipe Size Chart (wrap a string around and measure length of string to find pipe size)

Copper Pipe or PEX tubing
2.75" (70mm) = 3/4" pipe
3.53" (90mm) = 1" pipe
4.32" (110mm) = 1 1/4" pipe
5.10" (130mm) = 1 1/2" pipe

Flexible Polyethylene Pipe
2.96-3.33" (75-85mm) = 3/4" pipe
3.74-4.24" (95-108mm) = 1" pipe
4.90-5.57" (124-141mm) = 1 1/4" pipe
5.70-6.28" (145-160mm) = 1 1/2" pipe

Steel Pipe or PVC Plastic Pipe
3.25" (83mm) = 3/4" pipe
4.00"(102mm) = 1" pipe
5.00"(127mm) = 1 1/4" pipe
6.00"(152mm) = 1 1/2" pipe

Why do they call it 1/2"pipe?!

Strangely, there is nothing about a ½" pipe that is ½", be it copper, iron, or PVC. The outside diameter of copper is 5/8", and the inner diameter is either 0.527", 0.545", or 0.569", depending on the series.

So-called ½" galvanized iron pipe is 0.840" outside diameter and 0.622" inside. PVC is the same outside as iron pipe, but it is 0.608", 0.528", or 0.480" inside.

If no dimension is ½", why call it ½" pipe?

At its introduction in the 1930s, copper pipe was indeed standardized at the nominal diameter inside with a 1/16" wall, making it 1/8" bigger on the outside. As the metallurgy improved, allowing manufacturers to use thinner metal (and thus increase profits), they increased the inner diameter rather than decrease the outer diameter simply to allow the pipe to fit existing fittings.

As manufacturers began to make bigger and bigger pipes, they found that 1/16" wall thickness was insufficient. Thus, the inner diameter of larger pipes is *smaller* than the nominal size, while smaller pipes are *larger*.

Sediment Removal CHEAT SHEET

CLEAN WATER SYSTEMS

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1. Do The Basics

- ☐ Test Water Chemistry
- ☐ Check Well Water Flow Rate
- ☐ Perform Toilet Tank Check

- ☐ Check Water Heater
- ☐ Determine Diameter of Pipe

2. Decide on Goals

- ☐ Filter strainer or centrifugal separator?
- ☐ Cartridge filter micron size desired?
- ☐ Auto Sediment Backwash Filter?
- ☐ Improve Water Pressure ?

3. Installation

- ☐ Buy Direct + Install Yourself OR
- ☐ Buy Direct + Hire a Plumber for Installation OR
- ☐ Buy from Water Treatment Dealer
- ☐ Follow Check List for Best Installation Practices

4. Quality Control

- ☐ Set up Maintenance Schedule
- ☐ Clipboard with Check List

Questions? Email us at info@cleanwaterstore.com or call toll-free 888-600-5426 or 831-462-8500