



Clean Water Made Easy

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The Complete Guide to Iron Treatment

Practical Solutions for Treating Iron In Well Water



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How to Treat Iron, Manganese & Odors In Well Water

Iron is one of the earth's most plentiful resources, making up at least five percent of the earth's crust. In well water, iron is usually found in a dissolved state and may appear clear when first drawn from the tap.

The maximum level of iron recommended in water is 0.3 mg/L, which is the same as saying 0.3 Parts Per Million or PPM. When the level of iron in water exceeds the 0.3 mg/L limit, the water may appear a red, brown, or yellow color and stain laundry and fixtures. The water may also have a metallic taste and an offensive odor. Water system piping and fixtures can become restricted or clogged, and appliances such as water heaters, dishwashers, and washing machines can become plugged with rust and sediment.

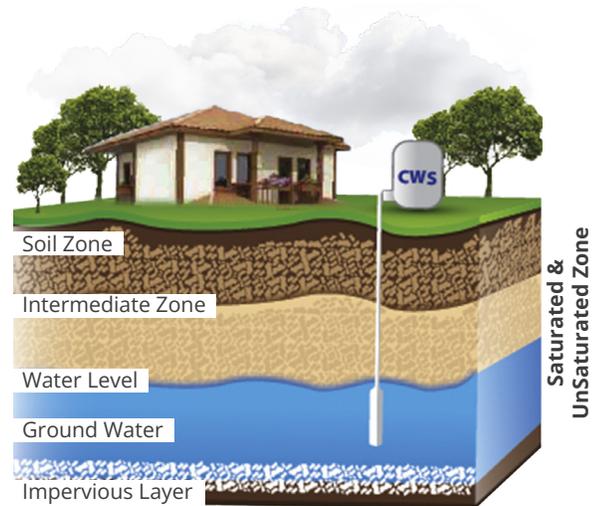
Iron gives water a disagreeable metallic taste. When the iron combines with tea, coffee and other beverages, it produces an inky, black appearance and a foul, rusty taste.

There are four main types of iron or conditions in which iron is found in well water:

- Soluble "Clear Water" Iron
- Insoluble Oxidized "Red Water" Iron
- Organic Iron
- Iron Bacteria

Questions to Ask When Choosing an Iron Filter:

1. What type of iron do I have in my water system?
2. What is the flow rate I have available to backwash the iron filter I choose?
3. Do I have manganese, hydrogen sulfide odor, iron bacteria, or tannin in my water?
4. What is the pH (acid or alkaline nature) of my water?
5. According to the water test results, will the water treatment unit remove the total iron concentration?



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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.

How to Treat Iron, Manganese & Odors in Well Water

Test Your Water

If there is an iron problem with your water supply, the first step is to determine its source. The source of iron may be from the corrosion of iron or steel pipes or other components of the plumbing system where the acidity of the water, measured as pH, is below 6.8.

A laboratory analysis of water to determine the extent of the iron problem and possible treatment solutions should begin with tests for iron, iron bacteria, pH, manganese, tannins, hardness, and total dissolved solids. Take the sample as close to the well as possible.

It should always include a pH test, which indicates if the water is acidic or alkaline. With these results, you can identify if you need any type of water treatment, and what type of system to select, based on your water chemistry.

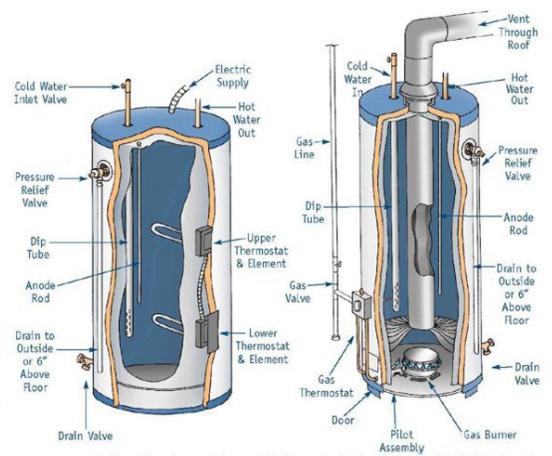
Avoid in-home water testing by water softener salespeople during sales demonstrations.

For health-related issues, include at minimum a test for total coliform and e-coli (fecal coliform). If infants and children will be drinking the water, a complete general, mineral, metals and bacteriological test is recommend.

If the source of water is a public water system and you experience iron-related problems, it is important to contact a utility official to determine whether the red water is from the public system or from the home's plumbing or piping.

Check For Odors in Well Water & Water Heater

Run a hose bib or tap as close to the well as possible and fill a 5-gallon bucket or other container. If you smell a "rotten egg" odor, this is hydrogen sulfide gas. If the water smells like oil or asphalt, this might be due to manganese. If the water smells like cucumber or sewage this is usually a result of iron and/or sulfur bacteria.



Water heaters can accumulate rust and sludge. Iron and sulfur bacteria can create sulfur odors in water heaters.

How to Treat Iron, Manganese & Odors in Well Water

Run water from both hot and cold taps to determine if there is an odor in the hot water that is not in the cold water. This indicates a problem with the water heater. Iron and sulfur bacteria can interact with the anode rod in water heaters, resulting in hydrogen sulfide gas' presence in the hot water only. Changing the anode rod to an aluminum rod can often solve this problem.

It is recommended that you drain your water heater at least once per year. This will flush out sediment that may accumulate in the bottom and give you an idea of your sediment's type and color, if indeed any sediment is present.

Perform a "Toilet Tank Inspection"

Unless your 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—if you see slimy rusty deposits on the sides of the tank, and frothy bubbles in the tank water, this is a good indication of iron bacteria.



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, Pro-OX, 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 (Pro-OX, Greensand, Pyrolox)
Black stains	Iron and/or Manganese	Iron filter that removes manganese (Pro-OX, Greensand, Pyrolox)
	Ferric sulfide (black rust)	Iron filter (Birm, Pro-OX, Greensand, Pyrolox)
Pink stains	Airborne bacteria	Not water quality related; Clean with chlorine bleach

How to Treat Iron, Manganese & Odors in Well Water

Odor Identification and Solutions Chart

- Does the cold well water have an odor right out of the well, or from an outside hose bib?
- If there is an odor to the water, do all the taps in the home have the odor? Do some taps in the house (such as those upstairs, or from a particular bathroom or fixture) have greater odor than others?
- Does only your hot water have the odor, with the cold water having no odor?
- The best way to test odor is to use a tall drinking water glass or wine glass, and have at least two people perform the test by drawing the water and noting the odor.
- How would you characterize the odor? See chart below.

Odors	Source	Possible Remedy
Asphalt or oily odor	Manganese	Iron filter that removes manganese (Pro-OX, Greensand, Pyrolox)
	Petroleum	Oilsorb oil removal media with activated carbon; but in some cases its better to develop a new water source
Cucumber odor	Iron or sulfate reducing bacteria	Disinfection with chlorine, hydrogen peroxide or ozone followed by filtration
Earthy or grass odor	Geosmin	Produced by actinomycetes, blue-green algae, and green algae.
Garlic odor or taste	Methane gas	Off-gas into an open storage tank, ventilate well and use caution in treating this problem; methane is flammable
Metallic odor	Iron, manganese, or copper	Iron filter, or pH neutralizer if water is acidic
Pond or algae odors	Bacteria, organic matter	Disinfection with chlorine, hydrogen peroxide or ozone followed by filtration
Rotten egg odor	Hydrogen sulfide gas	Disinfection with chlorine, hydrogen peroxide or ozone followed by filtration and/or aeration or air injection systems.
	Sulfur bacteria	Disinfection with chlorine, hydrogen peroxide or ozone followed by filtration and/or aeration or air injection systems.
Sewage odor	Leaking septic tank	Repair or re-locate septic tank or well
	Bacteria	Disinfection with chlorine, hydrogen peroxide or ozone followed by filtration

How to Treat Iron, Manganese & Odors in Well Water

Determine Your Well Pump Flow Rate

Iron filter systems come in different sizes based on the flow rate of the water you wish to treat. For example, if your well pump can pump 10 gallons in one minute, you can choose an iron filter that will filter 10 gallons per minute.

When choosing an iron filter, it is important to know how many gallons per minute your well pump can pump. This information is critical as it will allow you to determine what size iron filter to install.

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, and 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.

It is easy! All you need is a 1 or 5 gallon bucket and a watch or clock. It takes just a few minutes:

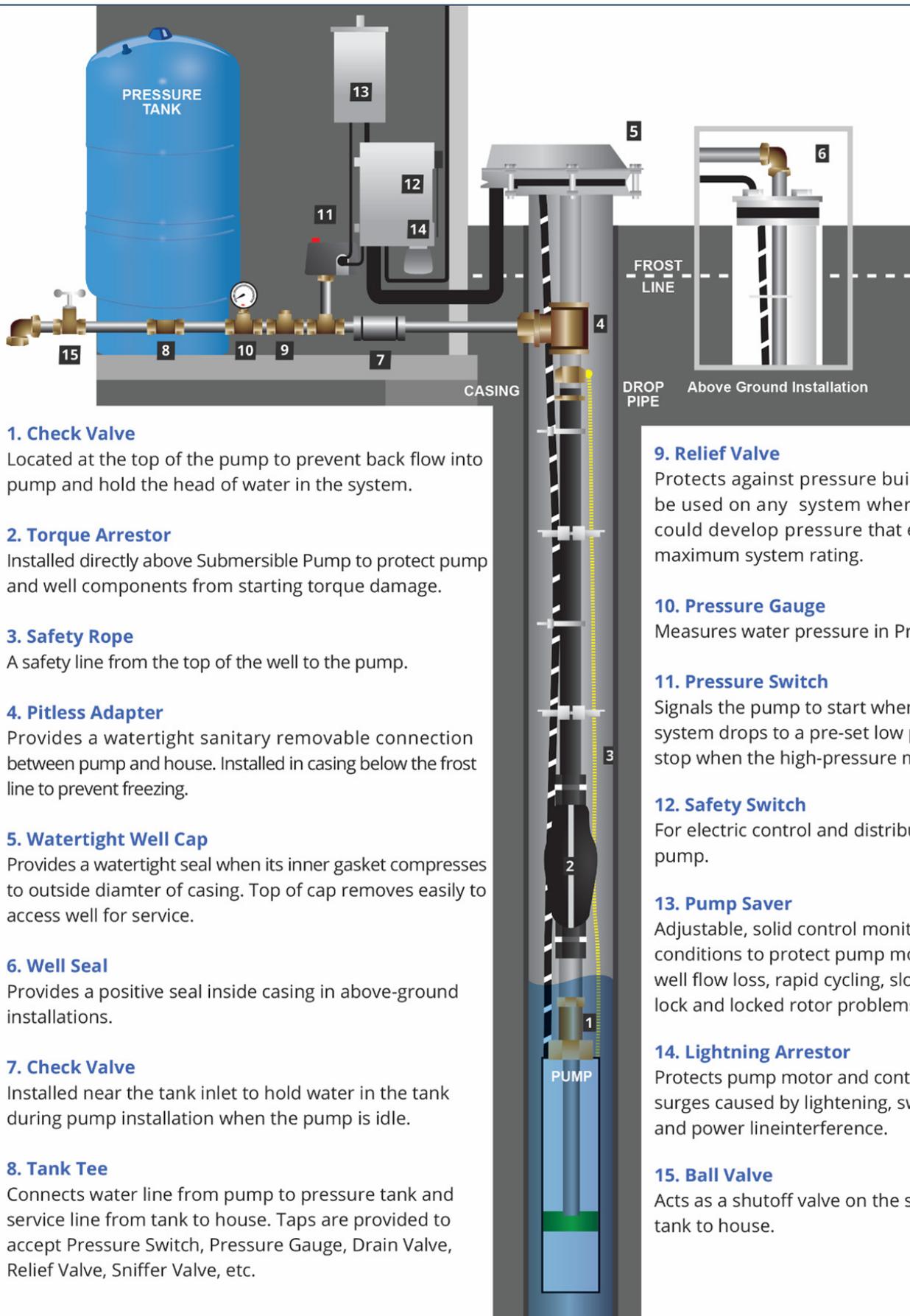
1. Open any hose bib or faucet until pump turns on.
2. Close hose bib or faucet and let pump fill up pressure tank until it turns off.
3. Using a 1 or 5 gallon bucket, open faucet and collect and measure all water discharged until pump turns on.
4. When pump turns on, immediately close faucet and start 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).

Pressure Tank with Submersible Well

How It Works: Submersible pump in well (1) is controlled by pressure switch (2). When pressure in pressure tank (4) drops below a preset level (typically 40 to 60 PSI) the pressure switch (7) 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 precharged air bag to moderate pressure in the piping system.

- | | |
|---|--------------------|
| 1. Well pump submerged in water | 5. Pressure gauge |
| 2. Well head with sanitary seal | 6. Hose bib |
| 3. Check valve (may be submerged in well and not visible) | 7. Pressure switch |
| 4. Pressure tank | 8. Gate valve |

How to Treat Iron, Manganese & Odors in Well Water



1. Check Valve

Located at the top of the pump to prevent back flow into pump and hold the head of water in the system.

2. Torque Arrestor

Installed directly above Submersible Pump to protect pump and well components from starting torque damage.

3. Safety Rope

A safety line from the top of the well to the pump.

4. Pitless Adapter

Provides a watertight sanitary removable connection between pump and house. Installed in casing below the frost line to prevent freezing.

5. Watertight Well Cap

Provides a watertight seal when its inner gasket compresses to outside diameter of casing. Top of cap removes easily to access well for service.

6. Well Seal

Provides a positive seal inside casing in above-ground installations.

7. Check Valve

Installed near the tank inlet to hold water in the tank during pump installation when the pump is idle.

8. Tank Tee

Connects water line from pump to pressure tank and service line from tank to house. Taps are provided to accept Pressure Switch, Pressure Gauge, Drain Valve, Relief Valve, Sniffer Valve, etc.

9. Relief Valve

Protects against pressure build-up. Should be used on any system where the pump could develop pressure that exceeds the maximum system rating.

10. Pressure Gauge

Measures water pressure in Pressure Tank.

11. Pressure Switch

Signals the pump to start when the water system drops to a pre-set low pressure, and to stop when the high-pressure mark is reached.

12. Safety Switch

For electric control and distribution to the pump.

13. Pump Saver

Adjustable, solid control monitors system load conditions to protect pump motor from dry well flow loss, rapid cycling, slow recovery, air lock and locked rotor problems.

14. Lightning Arrestor

Protects pump motor and controls from voltage surges caused by lightning, switching loads and power line interference.

15. Ball Valve

Acts as a shutoff valve on the supply line from tank to house.

How to Treat Iron, Manganese & Odors in Well Water

Check for Pipe Corrosion & Scale Build-up

Iron in water can cause the build-up of rust in pipes. If sulfur odor is present, this can cause sulfuric acid to build-up in water and corrode piping and fixtures. Unless your home is new, checking for pipe corrosion and scale build-up in the piping is important. Fortunately this is not difficult to do by using one of the following methods:

- Check for signs of blue stains, which can indicate copper corrosion, in fixtures or toilet tanks, and/or test water for copper.
- If you have galvanized iron pipe, look for signs of rust and rustcolored scale in the toilet flush tank.
- If possible, inspect the exterior of pipes and valves for 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.



Identify Pipe Sizes

It is useful to know the size of your incoming pipes. For instance, say you decide you want to install an iron filter system for your house. They come in different pipe sizes, such as 3/4" 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. Knowing what size piping you have solves this problem.

It is easy to check the size of your pipes. First, check the pipe itself, as its size will often be labeled or written on the side. If not, use the string method described below to measure your pipe's circumference. (Circumference is the distance it takes to go around the pipe once.)

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

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

How to Treat Iron, Manganese & Odors in Well Water

Iron Filters

Well water may appear clear but has iron in a dissolved state, also known as “ferrous iron”. Iron filters oxidize the dissolved ferrous iron in water to an insoluble particle and trap the rust in the iron filter media. Another way to say this is, iron filters turn clear iron into rust that can be removed.

A periodic backwash cleans out the rust and flushes the filter media clean. Various types of iron filter media are available including Birm, Greensand, Pro-OX[®], Filox[®], Pyrolox[®] and other brands.

These iron filters use a type of manganese dioxide filter media to remove the iron and manganese.

In some cases these oxidizing iron filters use air injection, potassium permanganate, chlorine, or ozone to aid the filter media in oxidizing the iron. Note that Pro-OX[®], Filox[®], and Pyrolox[®] are all solid manganese dioxide media granules which perform similarly to each other. Birm, greensand and other iron filter media use a coating of manganese dioxide over some other material which can wear off over time.



Comparison of Oxidizing Iron Filters

Iron Filter Type	Oxidizers Used	Maximum Recommended Iron Removed in PPM	Maximum Recommended Manganese Removed in PPM	Removes Hydrogen Sulfide?	Backwash Flow Rate Required GPM per Square Ft*	Weight Lbs per cubic foot
Birm[®]	Air	10	0	No	10 - 12	45
Greensand	Potassium Permanganate, Chlorine, Ozone	15	5.0	Yes	12 - 15	85
Pro-OX, Filox[®], Pyrolox[®]	Air, Chlorine, Ozone	20	5.0	Yes	15 - 25	120

* Backwash per square foot refers to the Gallons Per Minute required to backwash one square foot of the media. As an example, a 14" diameter tank has approximately a square foot surface area of 1 square foot. A 10" diameter tank has a square feet area of 0.5 square foot. So a 1.5 cubic foot Birm iron filter in a 10" x 54" tank would require 5 gallons per minute for backwash, whereas a Pro-OX filter would require a backwash flow rate of 8 to 12 GPM.

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Air Injector Birm Blend Iron Filters

Use Venturi-type air injectors to inject air

Birm is a trademark name of the Clack Corp and uses a type of granular filter media called "Birm." It is manufactured from a type of natural pumice mineral coated with manganese dioxide. As the water flows through the filter tank containing Birm media, a reaction occurs wherein the dissolved oxygen and the dissolved ferrous iron compounds form an insoluble ferric hydroxide. In plain English, as water containing iron flows through the media, if there is enough oxygen in the water, the Birm causes the iron to form rust, or solid iron particles. These rust particles get trapped in the filter media and are automatically backwashed out to drain once or twice a week, leaving the filter media ready to filter again.

Birm is cheaper than other iron filter media such as Filox or Pro-OX, but it has several limitations. It does not remove manganese or hydrogen sulfide gas, both of which are often found in well water containing iron. It also cannot be used if the water is chlorinated, and it is quickly fouled by iron bacteria.

In most cases, Birm requires an air injector system to be able to work effectively. Birm will not work well if the pH is less than 6.9 – 7.0. Birm media generally needs to be changed every 3 – 4 years for most residential applications.

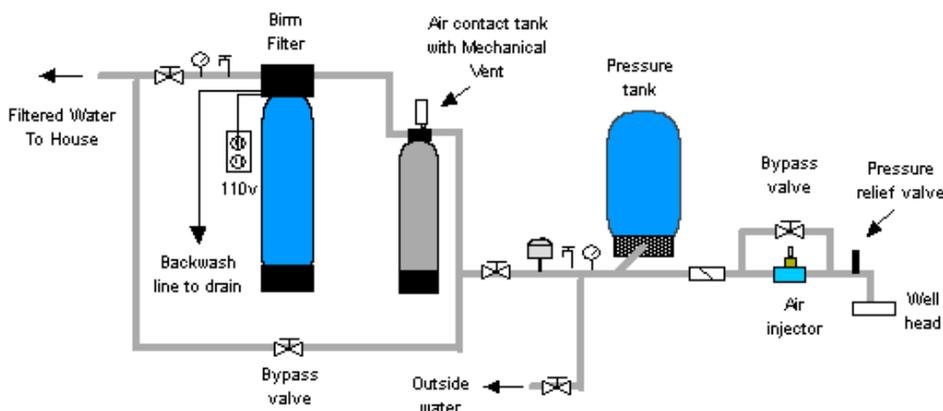
Birm is sometimes blended with other media such as FilterAg, Chemsorb, Calcite, and/or Corosex. The FilterAg or Chemsorb media help remove sediment. If the pH is less than 7.0, Calcite (a type of natural calcium media) and/or Corosex (magnesium) is added to the media to raise the pH up to neutral (7.0–7.4) range.

Air Injector Iron Filter "Terminator" brand



- Removes Ferrous & Ferric Iron
- No chemicals required, uses natural air injection
- Does not remove manganese
- Not recommended for hydrogen sulfide "rotten egg" odor
- Not recommended when iron bacteria is present
- Untreated water cannot have chlorine, tannin, or oil in it
- Birm media is light, works best for wells with low flow rates

Typical installation of a air-injecting venturi-type Birm-Blend iron filter system:



How It Works: A 1" NPT pipe size air-injector is installed after the pump before the well pressure tank. When the well pump runs, water flows past the air injector and air is drawn into the water.

The water flows through the air vent tank where excess air is released before flowing through the iron filter tank. Some pressure drop will occur through the air injector, but if your well can produce at least 8 gallons per minute at 30 PSI then the pressure loss is usually not noticeable.

How to Treat Iron, Manganese & Odors in Well Water

Air Charging Iron Filters

The air charge iron filter, as a single tank system, is an efficient and cost-effective system for the removal of iron and sulfur.

This type of iron filter maintains an “air pocket” in the top of the tank while the system is in service. As the water passes through the air pocket, iron and sulfur are oxidized. Additionally, dissolved oxygen is added to the water. The iron filter media bed then removes the iron and sulfur from the water.

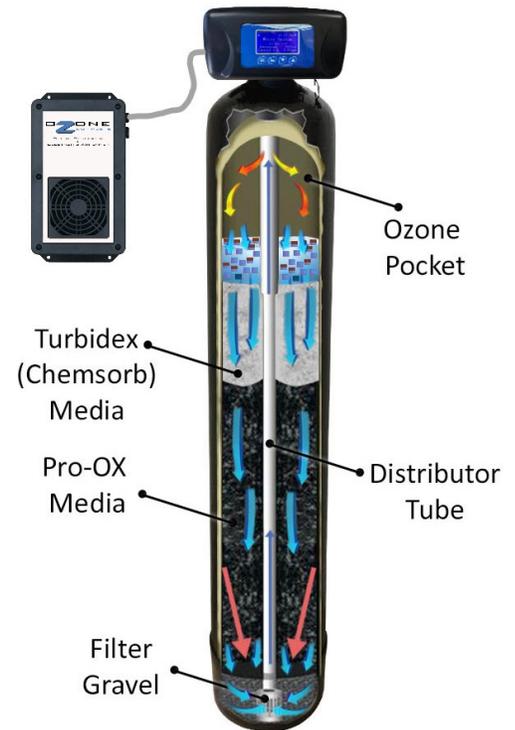
A daily backwash will remove accumulated iron and replenish the filter media bed. The regeneration process also adds a fresh air pocket to the system.

These iron filter systems come equipped with an automatic backwash control valve that automatically backwashes the system daily to clean the media and flush everything down the drain. By utilizing a patented piston in the control valve, the iron filter is able to put the whole oxidation process inside one tank, keeping minimizing down-time and maintenance costs.

Air Charging Iron Filter with Optional Ozone Injection

Water enters the tank through a pocket of air or ozone gas. This adds oxygen to water to enhance the effectiveness of the Pro-OX filter media.

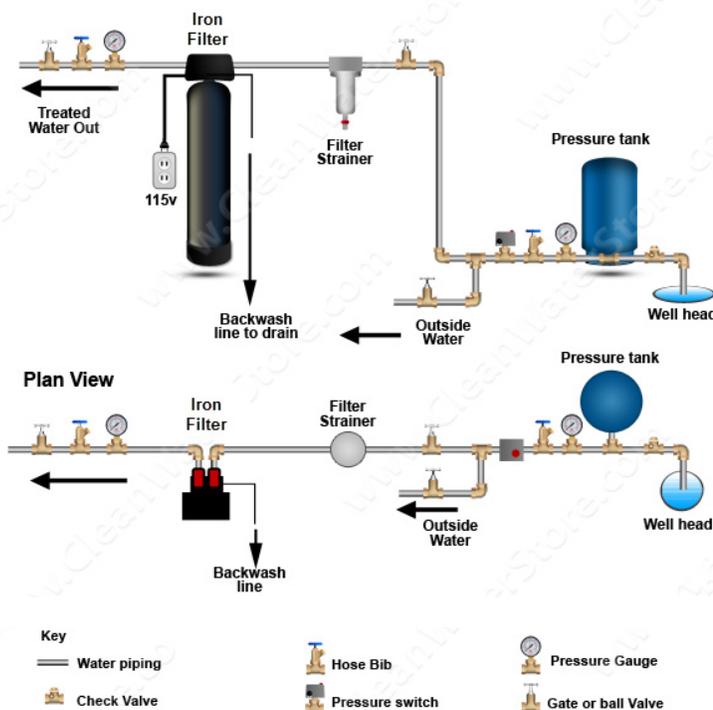
7500-Rev4 Pro-OX AIR



How it Works: When the iron filter backwashes each night, air is drawn into the iron filter, creating a pocket of air at the top of the tank. As water enters the iron filter it passes through a layer of air, where iron and sulfur are oxidized.

Optional ozone system can be used to kill iron bacteria and eliminate higher levels of hydrogen sulfide “rotten-egg” odors.

During the backwash, accumulated rust is flushed out to drain. The media stays clean and pressure is restored.



How to Treat Iron, Manganese & Odors in Well Water

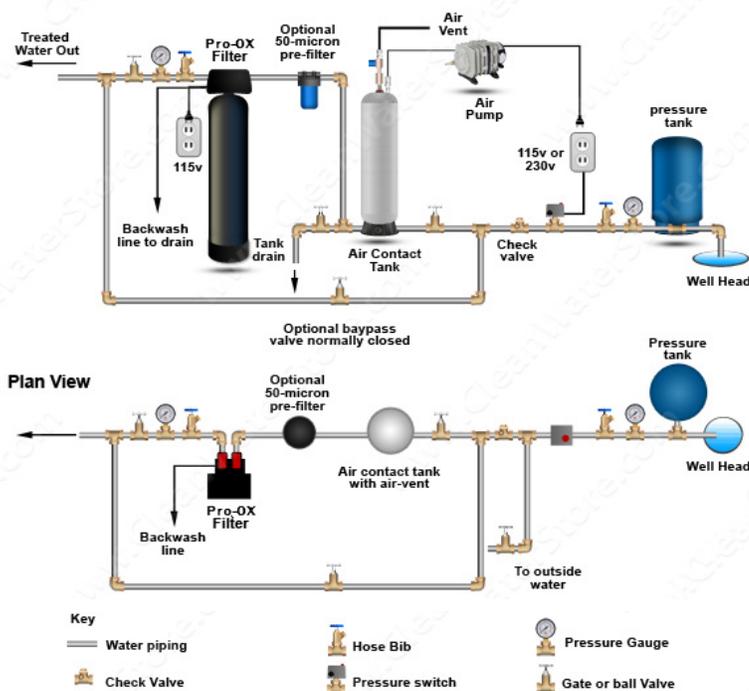
Air Compressor Oxidation Iron Filter Systems

This type of iron filter uses a compressor to inject air into the water. It offers a substantial improvement over the venturi-type air injector because a much larger volume of air is injected, making the filter more effective at eliminating sulfur odors and oxidizing higher levels of iron without the use of chemical oxidizers such as chlorine.

There is less pressure drop after the system with this type of iron filter because it does not rely on a venturi-type air injector. Unlike air injectors which can become clogged require period cleaning, the air compressor will reliably produce a large volume of air to oxidize iron without chemical oxidizers.

One effect of the air compressor is that the water itself does become saturated with tiny air bubbles. Your water may appear white when first drawn into a glass, but should clear instantly as the air leaves the water.

Typical installation air-injecting compressor-type Pro-OX Iron Filter System



How it Works: The compressor automatically injects the air into a special type of air vent tank which allows some minutes of contact time for the oxygen to dissolve in the water, and also allows for venting of excess air and gasses.

After the water is aerated, the Pro-OX iron filter removes the oxidized iron, periodically flushing it out to drain automatically.



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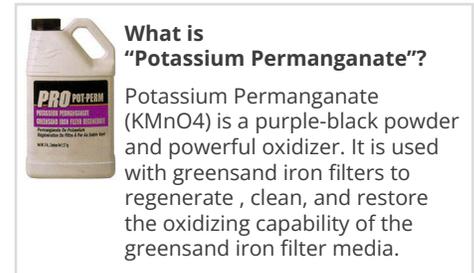
Greensand Iron Filters

Similar to Birm, the Greensand filter media has a special coating of manganese dioxide, which oxidizes iron, manganese, and iron in water upon contact with the filter media.

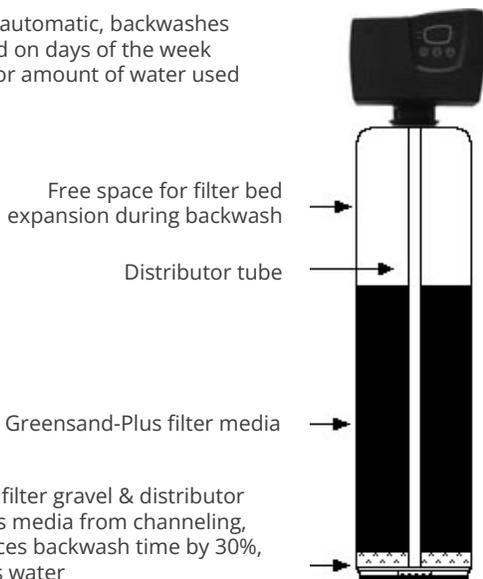
However, the coating of the Greensand filter media is much stronger. Greensand iron filters also remove manganese and hydrogen sulfide, are not affected by chlorination, and work over a wider pH range.

To provide the oxidizing power to precipitate iron and manganese, the iron filter is automatically cleaned and restored with potassium permanganate (a purple liquid) during each backwash cycle. As an alternative to using potassium permanganate powder, a chlorine injector pump can be used ahead of the greensand-plus filter to regenerate the filter media. Greensand media generally needs to be replaced every 4 to 6 years.

In some applications where the water has iron bacteria and/or hydrogen sulfide "rotten egg" odor in it, it is best to chlorinate the water prior to the greensand filter. The injection of chlorine (or hydrogen peroxide, or ozone) substantially increases the effectiveness of the greensand media, and allows it to work without the use of potassium permanganate and remove higher levels of iron and manganese.



Fully automatic, backwashes based on days of the week and/or amount of water used



How it Works: Water flows in from the top down through the Greensand Media, removing iron, manganese and sediment. Filtered water flows down to the distributor screen, up the distributor tube, and out to the household piping. Once or twice a week, the control valve starts a backwash and rinse, called a regeneration cycle. This typically occurs in the middle of the night and is completely automatic.

During the regeneration cycle, the Greensand media is first backwashed thoroughly. During the backwash, water flows down the distributor tube, up through the Greensand media, and out to drain, flushing out the accumulated iron, manganese, and sediment.

After the backwash, some permanganate solution is sucked out of the permanganate tank, and the greensand is rinsed and regenerated, restoring the exhausted media to a fresh state where it can continue to remove iron and manganese. The permanganate solution is rinsed out in two rinse cycles, and more water fills the permanganate tank, making more permanganate solution from the permanganate powder that is in the permanganate tank.

Eventually the powder runs out, and fresh permanganate powder must be added to the tank, typically once every 3—4 months.

How to Treat Iron, Manganese & Odors in Well Water

Manganese Dioxide Filters (Pro-OX[®], Filox[®], Pyrolox[®]) Intermittent Regeneration Type

Unlike Birm and Greensand, which are coated with a manganese oxide coating, these types of iron filters use a naturally mined solid manganese oxide ore in a relatively pure form.

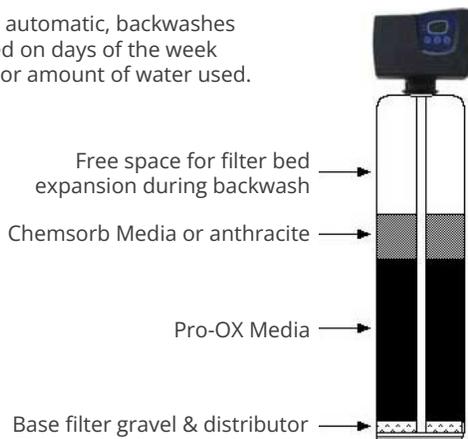
The iron filters utilize an oxidation-reduction reaction and filtration process similar to Greensand, but at a much higher level of performance. Pro-OX, for example, contains more than 85% manganese dioxide whereas Greensand contains around 1%. Pro-OX and other solid manganese dioxide media are very heavy and require a strong backwash flow rate to lift and clean the solid manganese dioxide mineral filter media.

An optional solution tank containing chlorine bleach can automatically clean and restore the media in a process known as a “batch regeneration,” as opposed to continuous regeneration where chlorine is fed continuously into the water ahead of the filter.

These filters are automatically backwashed every 1 to 3 days to keep the heavy media from fouling. The Pro-OX media out performs Greensand and Birm due to the purity of its particles combined with superior oxidation, filtration capacity, and durability.

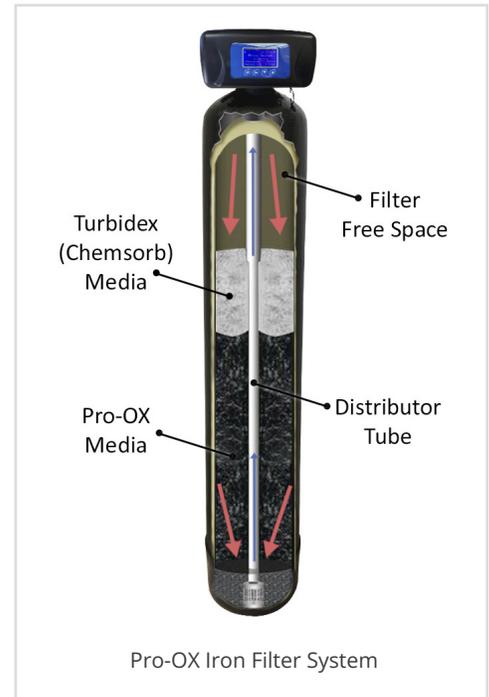
Pro-OX often lasts for 10 years or more, especially when used with a chlorine or ozone feed. It is the highest performing iron filter media and works great with chlorinated water, or when regenerated intermittently with chlorine.

Fully automatic, backwashes based on days of the week and/or amount of water used.



How it Works: Water flows in from the top down through the Pro-OX media, removing iron, manganese and sediment. Filtered water flows down to the distributor screen, up the distributor tube, and out to the household piping. Once or twice a week, the control valve timer starts a backwash and rinse, called a regeneration cycle. This typically occurs automatically, in the middle of the night.

During regeneration, the Pro-OX media is first backwashed thoroughly. During the backwash cycle, water flows down the distributor tube and up through the Pro-OX media and out to drain, flushing out the accumulated iron and manganese and sediment.



- Removes Ferrous & Ferric Iron
- Removes manganese
- Removes low levels of hydrogen sulfide “rotten egg” odor when chlorine or peroxide rinse is used.
- Not affected by iron bacteria when chlorine or peroxide rinse is used.
- Works with chlorinated water.

How to Treat Iron, Manganese & Odors in Well Water

Chlorination and Iron Filtration

In some applications, chlorine injection is a good idea. Chlorine (liquid bleach) is a low-cost and very effective way to oxidize iron, so the Pro-OX or Greensand iron filter media remove iron and manganese and eliminate problems with iron bacteria and sulfur odors.

Chlorine injection into well water serves multiple purposes beyond just the oxidation of iron and manganese. This process also significantly enhances the performance of iron filters by facilitating the conversion of soluble iron and manganese into their insoluble forms, which are then easily trapped and removed by the filter media.

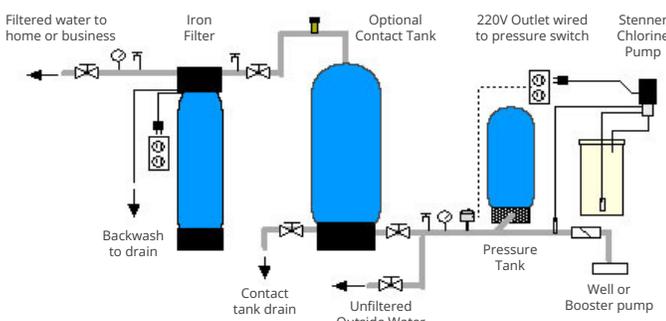
Furthermore, chlorination is highly effective in addressing issues related to iron bacteria and sulfur odors, providing a dual benefit of water purification and odor elimination. Due to its strong oxidizing properties, chlorine ensures the destruction of bacteria and other pathogens, thereby improving the overall safety and quality of well water.

Additionally, it's essential to consider the system design and maintenance when implementing a chlorination solution. Proper system configuration, including selecting a suitable chlorine injection pump and the correct sizing of iron filters, is crucial for achieving optimal water treatment results. Regular maintenance, including monitoring chlorine levels and replacing filter media as necessary, ensures the long-term effectiveness and efficiency of the chlorination and filtration system.

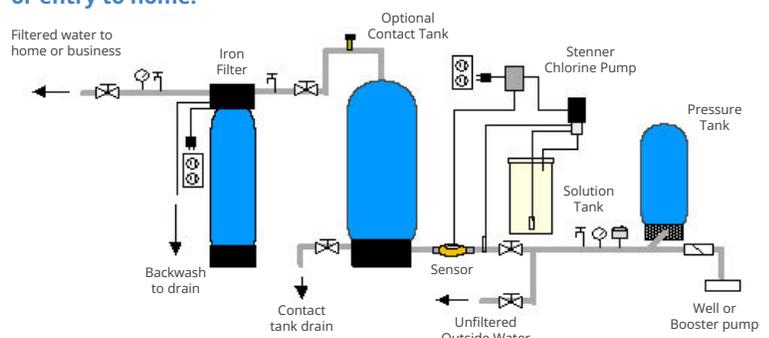
Lastly, while chlorine is a powerful and cost-effective treatment option, managing the chlorine residual in the treated water is essential. After oxidation, the remaining chlorine must be removed, typically through carbon filtration or aeration, to make the water safe and pleasant for household use. This final step is critical to prevent the taste and odor issues associated with chlorine, ensuring that the water meets health standards and is acceptable to consumers.

If a contact tank is used after the chlorine is injected and before the water flows into the iron filter, the chlorine will be dissipated. The chlorine residual further degrades after the iron filter so often a carbon tank filter is not required. The goal is zero chlorine residual in the household water, especially if its on septic tank.

Chlorination controlled by existing well pressure switch. Most common method used. Lowest cost.



Chlorination controlled by Flow Meter "Proportional Feed". Allows chlorine injection point to be after pressure tank, or at point of use or entry to home.



How to Treat Iron, Manganese & Odors in Well Water

Iron, Manganese & Odors Well Water Treatment

CHEAT SHEET



Clean Water Made Easy
www.cleanwaterstore.com

1. Do The Basics

- Test Water Chemistry
- Check Well Water Flow Rate
- Determine Type of Iron
- Check for Odors
- Perform Toilet Tank Check
- Check Water Heater



2. Decide on Goals

- Need to Correct pH or Not?
- Iron-Free or Softened Water?
- Disinfected Water or not?
- Improve Water Pressure or not?

4. 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

3. Choose Iron Filter

- Air Injection Birm Blend Iron Filter
- Air Charging Birm Blend Iron Filter
- Air Compressor with Vent Iron Filter
- Greensand Iron Filter w/
Potassium Permanganate
- Pro-OX, Filox®, or Pyrolox® Iron Filter
- Pro-OX, Filox®, or Pyrolox® Iron Filter with
Continuous Chlorine Feed
- Fine-Mesh Resin Water Softener

5. Quality Control

Set up Maintenance Schedule + Clipboard with Check List

- Test Well Water Annually for Coliform Bacteria
- Test Treated Water Quarterly for iron, pH



Greensand filter & permanganate tank

Manganese oxide filter

Birm filter & air tank

Questions?

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