

Water Purification – The Slow Sand Filters

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Building a Slow Sand Filter For Your Water Purification Needs

An Introduction to Water Purification

Water purification is a concept that most people take for granted. As important as it is for a home to get water, you need to ensure that water is clean. But many people are willing to stay comfortable with the knowledge that they're getting the water that they require.

The truth is that you need to keep your water purified if you want to keep your supply safe. The process entails getting rid of any chemicals, metals, or other items that might be in your water. Many positives come with getting the water purification process to work for you:

- Your water will have a better flavor thanks to how you're getting rid of all those contaminants. Such items might produce an uncomfortable taste in your water.
- You will not worry about lots of chlorine in your water. While some water treatment plants use chlorine for cleaning their water supplies, the process can trigger allergies and other medical threats over time.
- You will reduce the risk of E.coli and other forms of bacteria being in your water.
- Your foods and drinks will be healthier, what with the water being cleaner.
- Your plants will flourish when treated with water that is free of chemicals and metals.
- There's no need to be reliant on bottled water in your home when you have a purifier. The clean water in your home will be as clean as what you'd get in those bottles. You can save money on water expenses while also keeping from having to use up all that plastic.

The best part of purifying the water in your home is that you don't have to struggle with finding a way to take care of your water stores. You can use a unique filter in your home to assist you in getting clean drinking water that can work for years. You won't have to worry about any added chemicals in the treatment process, nor do you have to use any electricity to make it work.

But how are you going to get this work? You'll create a unique slow sand filter.

What Is a Slow Sand Filter?

A slow sand filter is ideal for your water purification desires. The filter produces clean water that you may collect through an aquifer or underground reservoir where surface water may be found in.

The surface water will move through the aquifer and will go through various layers of rock, sand, and other compounds. After a while, the contaminants and other items in the water will be filtered out by those compounds you have introduced. The water is then safe to drink and use for anything.

The slow sand filter can help you with keeping your water source clean. Best of all, you can use this if you are at a spot where you cannot treat your water in other ways like boiling, solar disinfection or distillation among other methods. What's more is that you might not have to spend anything extra to get your new filter ready.

Consider your slow sand filter to be an aquifer that you can create on your own. You are about to learn in this guide how you can get the slow sand filter to work for your needs.

Where Can You Use the Filter?

The slow sand filter you set up can be used anywhere you want. You could get this installed around a lake, river, or another spot that you find surface water. You may also gather water from the source and then feed it through a filter you install inland.

Is The Filter Effective?

You'll find that a slow sand filter can work wonders for your water treatment needs:

- You can get about 96 percent of all bacteria removed from the water.
- Nearly 100 percent of the protozoa in the water will also be removed. A protozoan is a single-celled organism that can live off of debris in a spot.
- Helminths or parasitic worms will also be cleared from the water.
- You can also clear out the turbidity in the water. The turbidity is the sediment that is suspended in the water. The sediment can cause the water to appear cloudy.

It is true that the slow sand filter is not necessarily going to get every bit of bacteria cleared out of your water. The effectiveness of the filter will be based on how contaminated the water in question is. You might have to use multiple filters or even extra methods for cleaning the water depending on what you have in your space. This includes boiling the water or using a solar disinfection process.

But the good news is that the slow sand filter should be good enough for most of your needs. The filter should be simple for ensuring you'll get your water treated the right way.

How Can Your Filter Work?

The slow sand filter works with a few points:

1. You'll get a container to work as the filter body. A large water barrel should work.
2. A lid should be secured on the top part of the container. The cover keeps contaminants from entering the space.
3. The sand materials used on the bottom part of the container will help with filtering out the water. The filter may include sand followed by pea gravel and then drainage gravel.
4. A clean container should collect the water that comes through.
5. The amount of time it would take for the water to go through the filter will vary based on how well-made the filter is and how contaminated the water is. You can always inspect the water with care after it goes through.

The Five Zones For the Filter

The filter will use the sand and both types of gravel to help with cleaning out the water that you apply. Five zones must work in your setup:

1. Inlet Reservoir Zone

You will pour your water into this part of the filter. You would remove the lid from the container at this juncture.

2. Standing Water Zone

Your water layer should be about two inches in height as it gets on top of the sand. The water should be dense enough to ensure the sand stays wet while oxygen moves into the other layers.

3. Biological Zone

This part of the filter forms around the top part of the sand. It should be about two to four inches thick. The microorganisms included here should consume the compounds that you're trying to clear out. The process is known as predation in that the microorganisms will destroy the pathogens that go through.

4. Non-Biological Zone

The sand that appears further down in your setup should be in the non-biological zone. There are no nutrients or oxygen out here to help with keeping the water clean.

At this point, the adsorption process should develop. The pathogens in the water will stick to one another and the sand grains. Eventually, these pathogens will die off because they don't have the oxygen and nutrients needed for survival.

5. Gravel Zone

The gravel zone is the spot that keeps the sand in place. The pea gravel and drainage gravel should be included here. The materials will prevent the outlet tube from developing blockages from sand deposits.

The best way to describe the process is that it works with what is called mechanical trapping. The process works in that the solid materials in the water will be filtered through the grains of sand in your filter.

How To Build Your Slow Sand Filter

The process for building a slow sand filter is not all that hard to complete. You'll need to ensure that you have the right materials on hand as well as the budget.

Here's a look at what you require:

- A plastic 55-gallon water barrel; the barrel should be around 24 inches in diameter and 36 inches in height
- A lid for the water barrel; the lid must fit the diameter
- A vinyl water hose; the hose should be rigid and about 5 feet long
- Sand; look for something with grains about 0.03 inches in diameter
- Drainage gravel
- Pea gravel up to 0.04 inches in diameter
- A sealant; the 3M 5200 marine adhesive caulk is a good option
- 24-inch diameter plastic sheet for diffusing

The good news about getting the slow sand filter ready is that you shouldn't have to spend far too much money on the process of getting the filter ready. You might spend about \$100 to get the filter ready. The barrel is the most expensive material that you will require, as that may cost around \$60 to \$75 depending on the size you use and the quality of the unit.

But it never hurts to spend a little extra to ensure you're going to get the best-quality material possible for the filtration effort.

Using the Materials For Your Work

1. Produce the body and hose setup.

Take the hose and measure how it will fit in your barrel. Drill a hole at the low part of the barrel; the hole should be of the same diameter as the hose. Make sure the hose fits tight and will not flex or become loose after you add it.

2. Apply the sealant to the outside part of the barrel where the hose is located.

Add the sealant around the area to ensure the hose will not flex or move about. This is also to keep the water from leaking. The 3M 5200 sealant is perfect for being easy to apply while also curing in about 24 hours after you affix the material. Wait for the surface to cure all the way before going on to the next step.

3. Route the hose in the direction of the appropriate collection bucket that you will add your clean water in.

Make sure the clean water bucket is safe for use. Keep the hose moving carefully so the material will not be stuck anywhere. Don't forget to keep the hose open without a valve that might slow down how well the water flows.

4. Cut your sheet of plastic to fit the barrel's diameter.
5. Drill about 100 or so small holes in your plastic.

The holes will help to deflect the flow of water when it is poured in the filter. The design keeps the biolayer safe.

6. Add the appropriate gravel materials into the barrel.
7. Add a few inches of sand into the barrel after the gravel goes in.

Make sure the sand that you use is safe. Look for a sterilized form of sand for the best results. This may entail a form of sand found in playgrounds. Don't forget to look at the sizes of the particles so you don't have anything that might impede the filtering process.

8. Check on the barrel and ensure the space is clean. The barrel should not have any dust or other outside stuff getting in the way.
9. Check on the drain tube; the tube should have a clean flow.

Your barrel should have a flow rate of about one liter of water per minute when you don't have sand or gravel. Any issues where the water is not moving through well enough might suggest there is a clog in your tube. The tube may not be clean if you notice any problems either.

Specifics For Getting the Materials For the Filter Ready

The process involved for getting your filter planned out should be noted well. This next process entails what you will do for getting your barrel ready for use.

1. Check on how clean the barrel is and that the hose is affixed accordingly.
2. Fill the barrel halfway with clean water.

The clean water works at the start to keep air pockets in the sand from developing.

3. Apply about two inches of drainage gravel. These should appear at the bottom part of the barrel.

The gravel needs to go over the drain hole. The gravel should also level and uniform in its layout.

4. Add two inches of pea gravel over the drainage material. Apply it evenly with a clear level.
5. Add the sand into the bucket.

Aim for at least 20 inches of sand. The large amount of sand ensures that the water will move out right.

6. Add water into the filter until the point when the water will stop flowing out of the outlet tube.
7. Smooth the top part of the sand to keep the space level.
8. Check on how deep the water is on top of the sand. The water should be at least two inches deep.

You might need to remove some sand if the water is not deep enough. Add more sand if the water is deeper than two inches at this point.

9. Flush out the filter.

Use about 10 to 20 gallons of water at this point. The key is to get clear water out of the filter. The flushing helps to clean out the filter and make it more effective.

10. Figure out what the flow rate is.

The flow rate should be around 0.4 liters per minute. A total which is more than this would suggest that the filter is not working well enough. A total that is less would also state that your barrel might clog up.

Getting the Biolayer Disinfected

The biolayer will appear in your barrel after a while. The layer will be produced from the sand removing all those pathogens and other forms of bacteria. But the materials collected in the purification process will not be visible.

You'll have to keep the biolayer maintained to make it easier for the filter to keep working appropriately. There are a few things you can do to maintain the biolayer:

- Use the cleanest water possible when you work with the biolayer.
- Use water from the same source if possible. It may be easier for the biolayer to work at this point.
- Keep the lid on the filter at all times unless you need to pour water in it.
- Use the diffuser properly so the biolayer will not be disrupted while in use.
- Swirl some of the sand around if the flow rate drops down. You might have to dump some of the sand and replace it after a while.
- Avoid adding chlorine in the filter or else the biolayer will be killed off.

Maintaining the Water the Right Way

Your filter will provide you with many great positives relating to clean and safe water. But you must also look at how you're going to maintain the water that you get out of the filter. You have to ensure your water is safe so the risk of contamination will be minimal.

There are a few things you can do for maintaining your water as necessary:

1. Make sure all your storage containers are clean.

Always boil any small containers you have or use a diluted bleach treatment for something larger. The cleaning process should produce a safe surface for the water to be stored in.

2. Keep your water containers in a cool and dark place.

Avoid keeping your water in a bright or humid spot. Those conditions can trigger bacterial growth.

3. You might need to add some unscented bleach to the water for long-term storage needs.

While it is often best to consume the water you filter out as soon as possible, you can still store the water if you treat it accordingly. You should add eight drops of bleach for every gallon of water you store. Stir the water up and then let everything sit for at least 30 minutes.

There might be a slight chlorine scent to the water. This is a normal result. Allow the water to sit if the scent becomes too intense.

4. Keep your water covered.

Always use an appropriate lid or top for your water. Do not allow the water to remain exposed.

5. Keep children and pets away from your containers.

The containers you have could be at risk of harm if you don't handle them right.

A Final Word

You can use a slow sand filter for your water purification needs when planned out right. You are bound to love how well the filter can work for you when getting the cleanest water possible. Be sure to use the filter carefully so you will have an easy time with making the most out of your water.