

Water Softeners

Water is considered 'hard' when it has excessive levels of calcium and magnesium dissolved in it. Hard water can lead to the following water problems:

- Scale build-up in pipes, resulting in decreased flow rates.
- Scale build-up on heating and cooling systems, leading to increased electricity costs and breakdowns.
- White film on glass surfaces and staining on water taps.
- Increased laundry costs due to hard water reacting with soap and laundry detergents.

How to Size the Water Softener

Picking the right water softener is an important step in the purification of your water. To



understand sizing, it is best to understand how it all works. What a water softener does is trade "hard" minerals in water for "soft" minerals in water. The typical trade is as calcium (hard mineral) enter a water softener it is traded for sodium (soft mineral). Inside a water softener are a bunch of chemical magnets called "ion exchange resin". These little chemical magnets do the trading. The more chemical magnets you have in a softener, the higher the capacity is. Capacity is the amount of liters/kg's a softener will purify before you need to recharge (regenerate) it. Capacity of water softeners are measured in "grains" or "grain removal". This is a chemical measurement that has been used a long

time. One "grain per liter" is equal to 4.275 parts per million. The average water has 4-5 grains of hardness per liter. You can calculate the exact amount of hardness you have in your water using a water softener test kit. To calculate how much water you need to purify, multiply the number of people in your house by 300. (the average person uses 300 liters of water per day). For an average family of 4 the calculation would look like this:

$$\begin{aligned} \text{People} &= 4 \\ \text{Liters per person} &= 300 \\ \text{Liters used per day} &= 4 \times 300 = 1200 \\ \text{Grains of hardness} &= 5 \\ \text{Total grains used per day} &= 6000 \end{aligned}$$

How to treat hard water

Hard water can be treated using a distillation or reverse osmosis process. These processes are generally not used for softening purposes because of their relatively high capital and running costs. The most commonly used equipment for the treatment of hard water is an ion exchange water softener.

Water Softeners - how they work

A water softener reduces hardness in water by removing the calcium and magnesium ions in the water, and replacing them with sodium ions, which do not lead to any form of scale build-up or precipitation.

A standard water softener consists of 2 vessels. The first vessel contains a sodium coated zeolite ion exchange resin. Water passes through the resin vessel under pressure, flowing over the softener resin, which attracts the calcium and magnesium ions to its surface, exchanging them for sodium ions.

Once the softener resin has reached the end of its service cycle and can hold no more calcium and magnesium, the water softener automatically starts a regeneration cycle, drawing a solution of brine from the second vessel, the brine tank, into the softener resin vessel. The brine solution washes the softener resin, causing the calcium and magnesium ions to be washed to drain, and the resin to be regenerated with sodium ions.

After a period of time (90-180 minutes, depending on the softener size and configuration), the resin vessel automatically rinses itself with clean water and switches back into service, ready to start softening water again. The system also automatically adds more water to the salt in the brine tank to produce more brine for the next regeneration cycle.

The majority of water softeners supplied are fully automatic. The only operator assistance required is the addition of salt to the softener's brine tank occasionally.

Water Softeners - Features

- Corrosion resistant resin and brine tank construction.
- Timer-based automatic regeneration.
- Softening media-high quality softener resin provides stability and uniform size for top performance and long life.
- Accurate brine control- a single turn of the brine control sets the brine dosage and capacity.
- Blend valve to allow accurate set-up of soft & hard water mixing.
- Simple inline configuration for ease of installation and maintenance.
- Range of softener systems to suit household, commercial and industrial applications.
- Available in simplex and duplex configurations for intermittent or continuous use.

Water Softener Specifications Guide;

Model	Exchange Capacity	Inlet / Outlet Ports	Maximum flow (m /hr)	Resin Tank Size
255-10	63 m ³ /°F	20 mm	0.4	6" x 35"
255-25	157 m ³ /°F	20 mm	1.0	8" x 47"
255-50	315 m ³ /°F	20 mm	2.0	10" x 54"
255-75	472 m ³ /°F	20 mm	3.0	13" x 54"
255-100	630 m ³ /°F	25 mm	4.0	14" x 65"
255-150	945 m ³ /°F	40 mm	6.0	18" x 65"
255-200	1260 m ³ /°F	40 mm	8.0	20" x 69"

Operating pressure: 200-600 kPa

Vacuum: none. Tank warranty is void if subject to vacuum. Vacuum breakers are recommended with all fiberglass tanks.

Power supply: 220 VAC 50Hz

Temperature range (water temp): 5-35°C

Turbidity: 5.0 NTU max.
Chlorine: 1.0 mg/l max.
Iron: 5 mg/l max.

Water Softening Applications & Benefits

- Reverse Osmosis & Deionizer pre-treatment.
- Apartment buildings, assisted living facilities and hotels-quality water for laundry, dishwashers, boilers.
- Office buildings-For heating plant pretreatment, tenant convenience and general housekeeping.
- Restaurants-For dishwashing, cleaning materials savings, scale reduction.
- Car washes-quality results, detergent and water heating savings, scale reduction.
- Industry-For process and make-up water, boiler and cooling system pretreatment, general housekeeping.

Water Softener design considerations

In order to accurately size a water softener for your residential, commercial or industrial application, we will need to know the following:

- The amount of water you expect to use per 24-hour period.
- Your peak water demand.
- Operating hours per day.
- Your water pressure.
- The hardness of your water.
- What you plan to use softened water for.

Removing Iron with a water softener.

Water softeners can remove a limited amount of dissolved Iron from your water. Softeners do this because Iron likes to stick on to the surfaces of ion exchange resin. A standard water softener contain ion exchange resin that will allow it to remove Iron, if the Iron level is less than 4 p.p.m/mg/l. A special fine mesh resin softener contains smaller bead sizes, which give Iron more places to stick to. Fine mesh Water Softeners can remove dissolved Iron up to 10 p.p.m. As the resin is regenerated the Iron is flushed off the surface of the resin and sent to the drain. The addition of an inexpensive resin cleaner will assure more complete Iron removal and will give you extended life of the resin beads. Generally staining can be seen with iron levels as low as 0.25 p.p.m. So there is a good chance that if you have Iron staining problems, a water softener might just fixed the problem and give you soft water all with one device. If you Iron level are higher then you may need to purchase an Iron filter for levels above 5 p.p.m.

Installing a water softener

Installing a water softener is not a difficult task if you have basic copper plumbing skills. If not any plumber should be able to install it for you at reasonable rates. There are 3 water connections to a softener. Basically there is an in, an out and a drain. You can plumb a water softener with flexible tubing which makes the job

even easier. Start up is also very easy and we are available for free tech service on any products you purchase from us.

FAQ - Concerns about Sodium and Potassium in softened water.

For those who need a sodium restriction, limit sodium intake to 3,000 milligrams per day as suggested by the American Heart Association. A teaspoon of salt contains 2,300 milligrams. Sodium helps your body maintain water balance. Too much sodium, can cause fluid buildup or elevated blood pressure. This puts extra strain on the heart and can make medications less effective. Consider replacing table salt with herbs and spices. Use fresh foods instead of processed, canned, prepackaged and convenience foods to limit the amount of salt in your diet.

All water softeners can be regenerated using Sodium chlorine or Potassium chloride. Since water softeners trade hard minerals for soft minerals that it gets from the regeneration chemical, some people with restricted Sodium diets are concerned about the levels of Sodium in their softened drinking water. The best way to eliminate this concern is to regenerate your softener with Potassium chloride pellets, The softener works the same with either type.

Each grain of hardness in your water will end out equaling 4-5 milligrams per liter of Sodium or Potassium depending on what you are regenerating the water softener with. With a low sodium diet of 3000 milligrams, average water would contain 170 milligrams per liter or water. Under this scenario you would have to drink 17 liters of water or 4.6 gallons or water per day to hit the limit.

Insider Tip from the manufacturing engineers: Use the Minimum Hardness Capacity (MHC) of a softener (not the maximum capacity) to gain a 40% salt savings advantage.

Typical Mineral Tank Sizes and Typical Minimum Hardness Capacity (MHC):

9x48" Tank = 28.4lt or .028cuM =MHC; 20,000 Grains=Max. Capacity: 30,000 GPR
10x54 Tank = 42.5lt or .043cuM=MHC: 30,000 Grains=Max. Capacity: 45,000 GCR
12x52 Tank = 56.6lt or .057cuM=MHC: 40,000 Grains=Max. Capacity: 60,000 GCR
14x65 Tank = 85.0lt or .085cuM=MHC: 60,000 Grains=Max. Capacity: 90,000 GCR
16x65 Tank = 113.3lt or .113cuM=MHC: 90,000 Grains=Max. Capacity: 120,000 GPR
21x62 Tank = 198.2lt or .198.2cuM=MHC: 140,000 Grains=Max. Capacity: 210,000 GPR

**GCR = Grains Capacity until next Regeneration*