

## Water Softeners

To explain why water softeners are beneficial and how they work, one needs to understand the differences between hard and soft water. It is presumed in this document that the water you are using meets all health regulations and is known to be safe.

### WHAT IS HARD WATER?

Hard water contains large amounts of calcium and magnesium—two minerals that cause the soapy scum on glasses and lime residue on bathroom fixtures. While suitable for drinking and gardening, hard water can cause mineral build-up in water heaters, pipes, dishwashers and showerheads, reducing its flow. Soap and shampoo's ability to lather is reduced, and laundry becomes stiffer and duller in appearance.

As Table 1 shows, water hardness is measured with five different classifications and can be expressed in mg/litre or parts per million (ppm) or grains per gallon (gpg).

### HOW TO DECIDE IF YOU SHOULD BUY A WATER SOFTENER

Above 121 mg/litre, you may want to consider a water softener. Generally speaking, groundwater (well water

taken from aquifers in the ground) is hard. Some municipalities in Canada use groundwater to supply water to residents. Residents, in small or rural communities, may not have municipal water service and get water from private or communal wells.

The most crucial step in deciding whether your home should have a water softener is to find out if your water is hard. If you have municipal water, call your water department or utility. If you have a well, contact a water-softening company that can conduct a test and classify its hardness.

### HOW DOES A WATER SOFTENER WORK?

A water softener uses a medium that serves to exchange “ions” of calcium and magnesium with sodium and potassium.

This occurs in four steps:

1. To do the ion replacement, the water in the house runs through a resin bed of small plastic beads or zeolite. The beads are covered with sodium or potassium ions. As the water flows past the ions, they swap places with the calcium and magnesium ions. Eventually, the beads contain nothing but calcium and magnesium, and softening stops. It is then time to regenerate the beads or zeolite.
2. To regenerate, the beads need to regain their sodium or potassium ions by being flooded with a salty, brine solution that is rich in sodium or potassium.
3. Once completed, the calcium and magnesium, dirt and sediments are flushed from the beads and into the drain in a process called backwash.

**Table 1** Water hardness classification

Classification	Water Hardness
Soft	Below 17 mg/litre or ppm (0-1 gpg)
Slightly hard	17.1-60 mg/litre or ppm (1.1-3.5 gpg)
Moderately hard	61-120 mg/litre or ppm (3.6-7 gpg)
Hard	121-180 mg/litre or ppm (7.1-10.5 gpg)
Very hard	Over 180 mg/litre or ppm (over 10.5 gpg)

- The final phase rinses the mineral tank with fresh water and loads the brine tank so it's ready for the next cycle.

Automatic water softeners are usually programmed to recharge at specific times that will not disrupt the occupants. It is more water-efficient to have a metered model that will regenerate only when required.

#### WHAT ARE THE BENEFITS OF A WATER SOFTENER?

A water softener reduces water hardness, making it easier to shower and clean fabrics and dishes. With softened water, less soap is needed for bathing and laundry. Skin feels cleaner and clothing softer. Pipes, fixtures and appliances have less scale build-up. With less build-up, appliances can operate efficiently. Mineral-derived odours may be reduced; and, there are fewer deposit stains on bathroom fixtures.

#### WHAT ARE THE DIFFERENT KINDS OF WATER SOFTENERS?

Water softeners come in four different types—offsite, manual, semi-automatic and automatic.

**Offsite**—the portable exchange unit does not regenerate at your home, a company replaces the cylinder.

**Manual**—requires manual operation to perform backwashing, brining and rinsing.

**Semi-automatic**—all functions are controlled automatically, with the exception of regeneration.

**Automatic**—all functions are performed automatically, including regeneration.

This last type of softener can be controlled by the following systems:

**Time-clock**—regenerates on a pre-set schedule.

**Water meter**—regenerates based on volume of water; has two units so one can recharge while other is operating.

**Hardness sensor**—monitors the hardness of the water and activates regeneration when necessary via a sensor. This system is most costly to buy but will use less water and salt.

#### WHERE TO BUY A WATER SOFTENER

Water softeners are sold by water equipment dealers, department and hardware stores. Units should be certified to the appropriate standards as outlined in the “Certification” section on page 3.

#### HOW MUCH DOES A WATER SOFTENER COST?

The price of water softeners varies according to the type and sophistication of the system. Automatic softeners are the most expensive, selling for around \$900 and up, on average. Some of the most popular units retail for \$1,800. Installation fees are extra—averaging about \$250 and up per unit.

#### WHERE DO I INSTALL A WATER SOFTENER?

Water softeners are installed where the water line enters the home. A professional installer should carry out installation. A separate cold line

will be required for drinking and cooking purposes if you prefer to not consume softened water.

#### WHAT DOES A SOFTENER LOOK LIKE?

There are two basic types of water softeners. There is a single upright cabinet style and an upright twin-tank style. Both are approximately 1.5 m in height and about 0.5 m in width.

#### HOW DO I MAINTAIN MY WATER SOFTENER?

While most softeners need little care and will last for many years—problems may occasionally occur.

To ensure smooth functioning, the water softener should regenerate at least once a week to assure its longevity. If your softener is not working properly, there are several things to watch for.

- Check for salt build-up in the brine tank. If a crust has formed, remove it using a vacuum, clean with soap and water, and rinse well.
- If your water contains iron, check for iron deposits in the resin bed. If it is present, use an iron-removing product to clean the softener.
- Check the resin tank injector. If it is plugged with “dirty” salt, shut off the softener’s bypass plug, run a manual regeneration and then clean the injector and injector screen.

Consider machines that have controls that minimize water use during regeneration. Often, one cycling a week will be sufficient for a family of four.

## CONCERNS ABOUT WATER SOFTENERS

### Is softened water safe to drink?

A water softener cannot remove microbiological contaminants that cause illness and should only be used to treat drinking water that is considered to be microbiologically safe.

Water softeners replace “hard” minerals with “soft” minerals such as sodium. The fact that sodium chloride (a salt) is used to soften water raises a concern about the potential health risks for those persons suffering from hypertension, kidney disease or congestive heart failure.

As the incidence of hypertension increases and the number of individuals on sodium-restricted diets rises, water softener manufacturing companies have begun to promote the use of potassium chloride as a safe alternative to sodium chloride. However, potential health risks are also a concern where potassium chloride (also a salt) is used to soften water.

Water containing high levels of sodium or potassium should not be used for drinking, making coffee, juice, infant formula or for cooking.

If you do not want this additional sodium or potassium in your diet, or if you are on a medically prescribed diet, a separate cold water line and faucet can be installed which bypasses the water softener. This allows for drinking and cooking with unsoftened cold water.

### When should I not use softened water?

Softened water is not recommended for lawn watering and other

outdoor uses as this will lead to more frequent system regeneration and higher costs. The high sodium content of the softened water can also affect the growth of grass and vegetation.

In the United States, some States are introducing legislation to restrict or ban water softeners. This is occurring for example in communities where wastewater is treated and reused to irrigate cash crops.

### Are water softeners noisy?

Water softeners create very little noise. The only sound you will hear is the movement of water through the unit during the backwash.

### Is softened water corrosive?

It has been found that ion exchange softening has no effect on the corrosiveness of water. Water pH, dissolved oxygen content, ammonia, chloride and flow velocity cause corrosion. These factors are unaffected by the softening process.

### Will my water bill increase if I use a water softener?

Water softeners are associated with increased well water pumping costs and somewhat higher water bills. The average water softener will need 55 to 400 litres of fresh water each time it regenerates the resin bed. To minimize costs, select a water-efficient model. Check how often the softener backwashes and how much water is used during regeneration. Also ensure that the unit is set to your family size and needs.

### What are the main operating costs?

The purchase of salt for regeneration will be the main operating cost. Salt is sold in large bags and can be obtained from a water equipment dealer, a supermarket or local hardware store. The other cost will be the water and energy required for operation and regeneration.

### Will a water softener harm my septic system?

While there have been concerns over a water softener’s impact on septic systems—such as killing the bacteria in septic tanks with salt, overflowing tanks with too much backwash flow and reducing the drainage field’s ability to absorb water—recent scientific studies remain inconclusive.

Salt has been found to have no harmful effects on bacteria and the soil of the drainage field. However, the volume of backwash flow can range from 55 to 400 litres per week or the equivalent of one to two standard filled bathtubs. Recharging the softener not more than once a week should reduce the amount of backwash entering the septic system.

## CERTIFICATION

Health Canada recommends that all products that come into contact with drinking water be certified to the appropriate health-based performance standard developed by NSF International.

In the case of water softener units, it is recommended that they be certified as meeting standard NSF/ANSI 44. Components

employed in conjunction with the water softener (i.e. filters) should also be certified to meet other applicable NSF/ANSI standards. These standards have been designed to safeguard drinking water by helping to ensure material safety and performance of water softeners that come into contact with drinking water.

In Canada, CSA International, NSF International, QAI, IAPMO and Underwriters Laboratories have been accredited by the Standards Council of Canada to certify drinking water materials as meeting the above-mentioned standards. These standards are widely accepted in North America, as they ensure the removal of specific contaminants, as well as the performance and mechanical integrity of the materials that come into contact with drinking water. Ask your dealer or retailer for a list of the substances that the unit is certified to remove.

### WHERE CAN I GET MORE INFORMATION ABOUT WATER SOFTENERS?

You can talk to various retailers and dealers to discuss different approaches to softening. Your local municipal water department or utility may also be of assistance to you.

### Websites

#### Canadian Water Quality Association—Water Treatment (October 2008)

<http://www.cwqa.com/watertreatment.php>

#### Health Canada—Water Quality (October 2008)

<http://www.hc-sc.gc.ca/ewh-semt/water-eau/index-eng.php>

#### NSF International—Drinking Water (October 2008)

[http://www.nsf.org/consumer/drinking\\_water/](http://www.nsf.org/consumer/drinking_water/)

Canada Mortgage and Housing Corporation acknowledges the contribution of Health Canada to the development of this document.

For further questions regarding water treatment and water quality, contact Health Canada at [water\\_eau@hc-sc.gc.ca](mailto:water_eau@hc-sc.gc.ca) or call 613-957-2991 or 1-866-225-0709.

To find more About Your House fact sheets plus a wide variety of information products, visit our website at [www.cmhc.ca](http://www.cmhc.ca). You can also reach us by telephone at 1-800-668-2642 or by fax at 1-800-245-9274.

#### Priced Publications

*Household Guide to Water Efficiency* Order No. 61924

#### Free Publications

##### About Your House fact sheets

*Your Septic System* Order No. 62795

*Buying a Toilet* Order No. 62935

*UV Water Treatment* Order No. 62953

*Water Distillers* Order No. 62898

*Water Filters* Order No. 62896

*Reverse Osmosis Water Treatment* Order No. 62962

*Buying a House With a Well and Septic System* Order No. 63319

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Printed in Canada  
Produced by CMHC 19-12-08  
Revised 2004, 2005, 2007, 2008

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