# BENRICH SERVICE COMPANY TRAINING PROGRAM©

# Water Treatment Level 1

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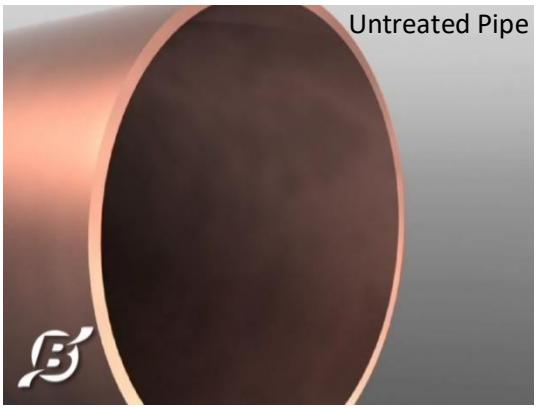
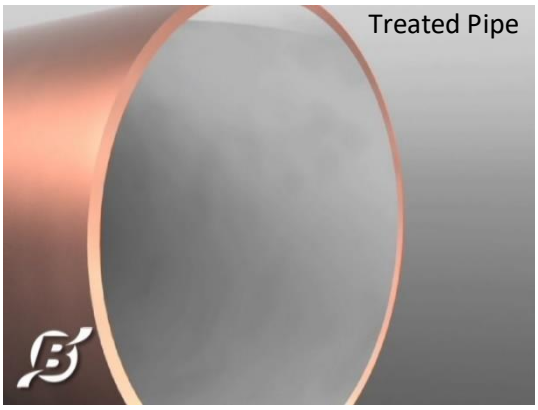
## WHAT IS WATER TREATMENT

Water treatment is used to protect copper and galvanized piping systems from the harmful effects of water. Common reasons customers use our water treatment include:

- To protect water supply systems from:
  - Pin-hole leaks
  - Scale accumulation
  - Corrosion
  - Rusty Water
- To extend the life of water heaters, storage tanks and boiler heat exchangers
- To improve efficiency and save gas consumption on water heaters by eliminating scale

## HOW IT WORKS




The product in our water treatment is called **Aquadene.** Aquadene is a blend of orthophosphates and polyphosphates. These two compounds serve two different water treatment purposes to protect piping systems.

**Orthophosphates** form a tough, water-resistant coating on the piping to prevent corrosion and erosion. This microscopic layer of film does not build upon itself and will dissolve over time, so

continual feeding is necessary. Benrich uses this to prevent the thinning of pipes which results in pin-hole leaks.

**Polyphosphates** are sequestering agents that surround, "invisible-in-water", metals like iron and manganese to hold them in suspension, thus preventing them from becoming visible once the water is chlorinated. Benrich uses this to prevent scale buildup within piping systems.

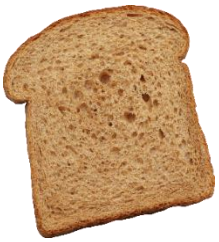
This orthophosphate and polyphosphate blend in our Aquadene treatment creates the ultimate pipe protection system for our customers.

## WHAT IT DOES NOT DO

The Benrich Water Treatment System does not…

- Water Treatment does not stop leaks 100%. It reduces the number of leaks and helps the piping system last longer. Piping systems will continue to get leaks, but if we can reduce them by 70 – 80%, the treatment is fulfilling its purpose.
- Water Treatment does not plug existing leaks. It helps prevents future leaks from occurring.
- Water treatment does not soften water
- Water Treatment does not smell, taste or change the texture of water

## IS IT SAFE?


Is water treatment safe? Yes! Water treatment is completely safe. Phosphates are used in over half of the United States water utility distributions. They are also a common ingredient found in everyday products such as breads, cheeses, sodas and toothpaste. Phosphate water treatment systems use less phosphate in milligrams per liter than the consumable items just listed.

Aquadene is an NSF (National Science Foundation) approved food-grade product used by municipalities and individual properties to protect and preserve potable water piping systems. A food-grade product means it is safe for human consumption.

Benrich sells its water treatment product to municipalities, school districts, apartments and condominiums.

# WATER TREATMENT VS WATER SOFTENING

Does water treatment soften water? No. However, our water treatment is commonly mistaken for water softening. Since we've already explained how water treatment works, lets now explain how water softening works to show the differences:

Water naturally has a variety of minerals such as calcium and magnesium. Whether a water supply is considered "hard" or "soft" depends on how much of these minerals are in your water. Soft water contains lower levels of calcium and/or magnesium than hard water.

Water softening is a process where calcium and magnesium ions (the minerals that make water hard) are exchanged for sodium ions resulting in soft water.

Here are some reasons to use water softening:

- Prevents build-up of minerals (scale) on the inside of pipes, fixtures, and hot water heaters
- Lengthens the life of some appliances such as dishwashers
- Reduces or prevents mineral spots on glassware
- Less soap and detergent used

**Why use water treatment over water softening?** Water treatment provides greater protection to piping systems from BOTH corrosion/erosion AND scale buildup. Water softening only protects against scale buildup. Water treatment is also typically cheaper and much easier to install since the equipment is much smaller. Although our product is categorized as water treatment, sometimes it's easier to explain it as a pipe protection treatment.

# GRANULAR AND LIQUID WATER TREATMENT VS CUNO FILTRATION

## BENRICH GRANULAR AND LIQUID WATER TREATMENTS

The Benrich water treatment systems are the superior treatment process when preventing pipe leaks, scale accumulation and corrosion within piping systems. Over time, they also remove existing scale by turning it back into dissolved solids. The water treatment dispensers are serviced and replenished monthly which lets us closely monitor and adjust how the treatment is fed resulting in accurate concentration levels. The Benrich water treatment system uses a safe food-grade compound called Aquadene that can be fed from a granular or liquid state which both provide the same high level of protection. Their differences are explained below.

### GRANULAR SYSTEM

The granular system provides a more economical installation and service price since there are fewer moving parts, yet it is just as effective as the liquid system.

The stainless-steel dispensers have a small footprint that is usually no more than 10” x 10”. These dispensers use adjustable orifices to feed the proper amount of granular Aquadene into the water in direct proportion to the amount of water used. The dispensers are connected to a venturi or custom designed dip tubes. For larger pipe sizes, a small pump and timer can be connected to increase the feed rate.

Feed rates are measured with water tests to ensure accurate and optimal protection for all piping systems. The dispensing equipment can be installed on a shelf, in a protective cage or below grade in a meter box. All dispensers come with a padlock for added security.

## LIQUID SYSTEM



The liquid system has more moving parts and is more expensive to install due to the materials used. It also has a slightly higher monthly service price.

This system uses a flow meter to provide an exact measurement of water flow and an injection pump to feed the liquid Aquadene in direct proportion to the amount of water being measured by the flow meter. The equipment is connected to the main water supply line using saddle clamps. It is housed in a custom-made steel box that is typically 30" x 30" above ground. This box is secured with a key entry system.

The system requires a 120v electrical connection to power the injection system pumps. The property is usually required to supply the electrical connection.

## CUNO FILTRATION


Cuno filtration is another option for properties with a high level of debris coming from city supplied water. They are typically serviced quarterly or semi-annually. They are more expensive to install compared to the granular water treatment, however the service cost is usually less expensive since they are serviced less frequently.

Filtration is most effective in filtering city supplied debris within your water. However, it is less effective when trying to prevent pipe leaks, scale accumulation and corrosion since you can't control the feed rates provided by the filters. Each cuno housing holds 4 long cylinder filters which are replaced during service. Although some properties use filter-only cartridges, the

majority use treated filters which have siliphos pellets in the middle of the filter that dissolve into the water system to help coat and protect the piping. Adjustments cannot be made to regulate or control how fast or slow the siliphos pellets dissolve and enter the water system. This results in inaccurate treatment levels and leaving your piping system at risk.

This system is typically installed on the cold-water supply line to a boiler or water heater system and is piped with a bypass for service.

## HOW TO SERVICE A WATER TREATMENT DISPENSER

1. Test the water for the residual value of the Aquadene since that last service interval. All hot water tests require that the sample vile of water be cooled down first. Below are the steps for the Hannah Phosphate Checker:
    a. There are two vials with each test kit. Keep clean untreated water in vial #1.
    b. Locate treated water source and run water for 30 seconds and then fill vial #2 with treated water.
    c. Add test packet to vial #2, put on the cap and shake gently for a few minutes until the powder is dissolved.
    d. Turn on the meter by pressing the black button once. C1 will display on the screen.
    e. Place vial #1 (untreated water) in meter and close the lid.
    f. Press black button again and wait for C1 to turn to C2.
    g. Open and remove vial #1 and replace with vial #2 (treated water) and close the lid.
    h. Press and hold the black button until the 3-minute timer appears and then release.
    i. Once timer finishes the countdown, take the final displayed reading and multiply by 2 to get your result. Result is measured in parts per million (PPM)


2. Shut off the water to isolate the dispenser (two ball valves attached to a venturi or a pair of dip-tubes)
3. Open the bleed screw in the dispenser cap to release the pressure and make cap removal easy
4. Using the cap removal tool or crescent wrench, remove the brass cap
5. Using a siphon hose, drain all the water from the dispenser
6. Open both valves fully, one at a time to ensure that there are no blockages present in the fittings, orifice, tubing etc. Clear any blockages before proceeding.

7. Flush the dispenser thoroughly to remove any loose or gooey compound
    a. Gooey compound can be removed by detaching the dispenser from the supply lines and then inverting it to shake and otherwise manually remove the goo. If this is unsuccessful, the dispenser may have to be replaced with another.
    b. Gooey compound generally means that the dispenser is not feeding, and it is time to look for the reason(s) that caused the goo to begin with.

8. Using a siphon hose, drain all water from the dispenser
9. Using a large-mouthed funnel, pour Aquadene into the dispenser. Fill only halfway until you get familiar with its feeding characteristics.
    a. Know your "maximums" and your "minimums" such as: How much compound per apartment unit? About how much did it use since the last service? This is the KEY to prevent overfilling and stoppage of feed.

10. Slowly open the incoming water line and let water slowly work its way down into the fresh compound. Pause to let the water level drop and then add more water until air bubbles are reduced
    a. Place the palm of your hand over the opening, pressing down forcefully. As the pressure builds and it becomes difficult to hold the pressure in, shut the valve off and slightly rock your hand to one side or the other and "burp" the dispenser. Do this several times as you introduce the water into the dispenser and the water will be forced down into the compound and minimize the potential of an airlock.

11. Cap the dispenser and do not overtighten as it will flatten the O-ring. If the O-ring has already become somewhat flattened and a slight leak occurs, gently snug the cap with your wrench until the leak stops.
12. Turn the incoming valve on first and then 5 seconds later, turn on the outgoing valve
13. Twist the bleed screw back and forth until all the air has been bled out of the dispenser
14. Tighten bleed screw but DON'T crush the gasket below
15. Thoroughly wipe down dispensing equipment and entire installation removing all dirt, debris, Aquadene residue and anything that would make the equipment look dirty and unprofessional
16. Check thoroughly for leaks as it is likely that you won't be seeing this dispenser for another month

## SERVICE TIPS AND REMINDERS

1. Don't let the dispenser run empty each month as you won't know when it ran out of compound. Vary your service intervals (one week early/late) to really get to know how your equipment performs.
2. Don't deliver more compound than the property calls for. Know your properties and how many apartment units are being served by each dispenser. Make sure that you have the sheet that provides you with the computation.
3. Don't flood the dispenser with water after you have filled it with fresh compound. Too much air will get trapped in the granules and it will create an air lock in the dispenser.
4. Do not stack fresh compound on top of a hard-cake that is already half filling the dispenser. The compound compresses into a hard-cake and it is easy to add more compound than is necessary. Get to know your equipment and DO NOT OVERFILL.
5. Don't forget to turn back on BOTH valves.
6. Don't forget to fill your paperwork out completely. No property or dispenser(s) is without its problems from time to time. If there aren't occasional problems noted on a route that has a couple hundred dispensers, there is something wrong! Note the problem on your paperwork and what you did to fix it and then let management know.

# WHY AM I STILL GETTING LEAKS?

Water treatment is not a miracle cure, and a property may always have leaks, but our job is to minimize them, not necessarily stop them all together. Some properties may have more problems than others and there are many factors that come into play when we attempt to diagnose the reason for the leaks.

The longer our water treatment equipment has been in service the better the results. When a property uses our water treatment but continues to get a high volume of leaks, it is most likely due to one of the following circumstances below:

1. **Soil-side Corrosion:** When pipes are buried below grade, hot or otherwise corrosive soil will deteriorate the piping from the outside in. Proper diagnosis of pipe deterioration is important and having pipe samples are a must to be able to help determine what is causing the deterioration.

2. **Air Bubbles:** Free Co2 in the water creates air bubbles in a domestic piping system and when the bubbles pop, they pit the pipe and at the same time, disrupt the Aquadene and its ability to lay down its protective film.
3. **Water is too hot:** Water that is hotter than it should be creates a more corrosive environment and thus escalates the speed at which the pipe deteriorates; it can also

minimize our water treatments' effectiveness. Keep hot water delivery temperatures as low as possible to extend the life of the piping and water using equipment; temperatures should not be set above 125 degrees where applicable.

4. **Oversized Pumps:** Central water heating systems with recirculation pumps that are larger than they need to be will shorten the life of the piping. These high velocities create a thinning of the inner walls of the pipes which will in turn, cause the pipes to leak. In addition, if we currently have our water treatment system(s) at a property like this, these pumps will scour the Aquadene water treatment film right off the walls of the pipe and will do little to no good when it comes to providing the proper protection.
    a. **Recirculation pumps** often have speed controls which allows you to turn the speed control down to the lowest number and thus reducing the erosion. Utilizing timers and or circuit setters to turn on and off your recirculation pumps during non-peak hours will also create a generous result. Once again, the constant movement of water with increased velocity will always be a problem.
5. **Piping layout:** Piping with lots of bends, elbows, tees and pipe joints can also be very detrimental to a piping system due to the turbulence that is created as the water moves through the convoluted piping system.
6. **Un-reamed Pipe:** Copper piping that hasn't been reamed after it is cut leaves a jagged edge and thus, causes the water to continually jump over that divot and causes the pipe to leak near that pipe joint.

7. **Flux:** Copper piping that has been joined together with too much flux will tend to eat away the pipe joint from the inside out as well as creating a flux gas that is highly corrosive and will cause isolated pitting that will ultimately result in a pin-hole leak.
8. **Management:** Unfortunately, the most common reason an account gets cancelled is due to a lack of knowledge or understanding about our product. Often, new management will take over a property without knowing the plumbing history. It may be a scenario where they see the monthly water treatment bill and notice that they are still getting leaks, so they decide to cancel the service. However, they don’t realize our water treatment was reducing the pipe leaks to 1 per month rather than 10 per month. It is common to have them request for our water treatment to be re-installed once the leak frequency increases after cancellation.

# INSTALLATIONS

It is important to explain to the customer that after installation, it takes about 3-4 months for our water treatment to lay down the layer of film over the property's entire piping system. That said, they should not expect immediate improvement as results will be delayed. When an account is cancelled, it will also take 3-4 months for our treatment to completely dissolve out of the system. Thus, the harmful results of removing the treatment will also be delayed.

## WHERE TO INSTALL

Depends on the needs of the property…

- **HOT & COLD water leaks** = Install on the main line(s) feeding the property so that you are treating both hot and cold water. Cold water leaks are rare, but depending on the age of the piping system, they can occur.
- **HOT water leaks only** = Install on the cold water supply line feeding the water heating system. This gets the best feed rate to the hot water. If this isn't an option, you can still install on the main line(s). Installing on one main line rather than multiple hot water systems may also be a cheaper option for the customer. Hot water leaks are commonly found with central hot water systems with return lines where the water is continually circulating.

## INSTALLATION EQUIPMENT

Water treatment systems are installed using one of the following options:

- Venturi: A venturi creates a pressure differential and feed rate proportional to water flow. This is used on pipe sizes that are 2" or smaller. It is installed by cutting out a section of pipe and soldering it in.

- Home-made Venturi: This is used on pipe sizes larger than 2" where a dip-tube application doesn't work. It is created by soldering reducers and Tee's together to create a pressure differential between the inlet and outlet of water flowing to the dispenser.
- Dip Tubes: Used on pipe sizes larger than 2". Holes are drilled directly into pipe with a tapping drill and then dip tubes are inserted into the pipe using saddle clamps. Although these installations can be performed with "live" water, Benrich requires all installations to have the water shut down to prevent unforeseen issues.

### INSTALLATION REQUIREMENTS

Our compound will not setup in hot water, therefore it must be installed on cold water lines and if feeding a hot water system, check valves need to be installed to prevent hot water from entering the dispenser. If you are adding a check valve to the heating system, a thermal expansion tank needs to also be installed after the check valve.

## COMPOUND CONSUMPTION

The amount of compound used on a property depends on how much water is being consumed from the point of installation. For apartment complexes, we measure water consumption based on the number of apartment units the dispenser is feeding and whether it is treating both hot and cold lines or just the hot lines. The chart below shows how much water is being used per month based on the apartment unit count.

*Note that the chart below is for both cold and hot water lines. If we are only treating the hot water, the amount of compound needed is approximately 30% of the amount shown.

| Apt. Units | Water Usage Gals/Mo. * | Dispenser Size | Aquadene lb Used/Mo. |
|---|---|---|---|
| 6 | 50,000 | SS 6X6 | 1 |
| 12 | 75,000 | SS 6X6 | 2 |
| 16 | 100,000 | SS 6X6 | 3 |
| 24 | 150,000 | SS 6X6 | 4 |
| 32 | 200,000 | SS 6X6 | 5 |
| 40 | 250,000 | SS 6X6 | 7 |
| 48 | 300,000 | SS 8X8 | 8 |
| 56 | 350,000 | SS 8X8 | 9 |
| 64 | 400,000 | SS 8X8 | 11 |
| 72 | 450,000 | SS 8X8 | 12 |
| 100 | 750,000 | SS 8X8 | 17 |
| 120 | 900,000 | SS 10X8 | 20 |
| 150 | 1,125,000 | SS 10X8 | 25 |
| 200 | 1,150,000 | SS 10X10 | 34 |
| 300 | 2,225,000 | 2 SS 10X8 | 50 |
| 400 | 3,000,000 | 2 SS 10X10 | 67 |
| 500 | 3,750,000 | 3 SS 10X8 | 83 |

When treating both hot and cold lines, 1 lb of compound will feed about 6 apartment units. When treating hot lines only, 1 lb of compound will feed about 18 apartment units.

We also have different size dispensers that can hold various amounts of compound as shown below:

- A 6x6 Dispenser can hold about 9 lbs of compound
- An 8x8 Dispenser can hold about 24 lbs of compound
- A 10x10 Dispenser can hold about 36 lbs of compound