Chlorination Systems

Chlorine is highly effective in destroying microorganisms in water. It is also a powerful oxidizer used to precipitate various contaminants in water.

With the introduction of the chemical free iron filter and ultraviolet, the number of chlorination applications has been reduced. However, there are still cases where a full-line chlorination system is the best solution for some water problems. Information is available concerning the alternate use of hydrogen peroxide for specialty applications.

Application

Following are the conditions where we recommend the installation of a full-line chlorination system:

1. Where hydrogen sulfide exceeds 3.0 ppm
2. Where combined levels of iron, manganese and sulfur exceed the limits for the chem-free or the iron & sulfur filter
3. Where disinfection is required to make the water bacteriologically safe
4. For livestock application requiring chlorine residuals
5. For community wells
6. To comply with user's personal reference (type of recommendation by governments).

Installation
Chemical Feeder/Solution Tank

The injection point should be installed after the pressure tank and before the holding tank.

This pump is wired to the pressure switch of the water pump(s). Thus, it is important that the chemical pump be the same voltage as the water pump. Specify 115V or 230V when ordering.

The injector and anti-syphon valves should be cleaned regularly according to the maintenance instructions provided with the pump.

Chemical Feed Solution

Is most often a mixture of household bleach (chlorine). Do not use a powdered pool type of bleach. If you must dilute the chlorine, be sure to use clean, treated water for mixing; otherwise, the mixture will be too weak to work and a sludge will build up on the bottom of your solution tank.

Shut-Off Valves

Are required on both sides of the injection point in order to be able to isolate the injector for cleaning and testing purposes.

Flow Meter

Optional when all water is not being treated - the flow meter is installed after the untreated water lines.

Retention Tank

Water should always be fed in at the bottom and the outlet should be at the top. A bleed off valve should be installed at the lowest point of the tank.

Retention of at least 20 minutes is required as calculated by the tank size and the recommended 4-5 gpm flow rate. Chlorine must have this time for an effective bacteria kill and to oxidize contaminants. At 5 USGPM, a 100 gallon retention tank would be required.

Multi-Media Filter

Installed after the retention tank to collect suspended matter such as clay, silt or ferric iron or oxidized manganese or sulfur. Pressure loss usually indicates more frequent backwash is required.

Activated Carbon Filter

Will remove any residual chlorine and trace organics in the water, improving taste and odor. Pressure loss or chlorine slippage usually indicates more frequent backwashes are required.

Water Softener

Installed after filtration equipment. The water softener should be applied when the water tests more than 1 gpg total hardness. Sizing of the correct model of softener should be done according to the normal three day sizing formula.

Test Cocks

Should be installed after each piece of equipment in order to analyze operating performance.

Plumbing

Should be in good order and all taps indicated should be installed. All plumbing, including pressure tank fittings should be a minimum of 3/4" for good flow rates and healthy backwash flows. A minimum of 20 psi should be maintained throughout the system.

Bypass valves are recommended on every filter and softener. PVC plumbing is recommended over galvanized steel.

Do not use polybutylene pipe with total chlorine levels over 2 ppm.

pH

If the pH is below 6.5, it must be increased to allow for efficient oxidation by the chlorine. This can be accomplished with the addition of soda ash by a separate feed system.

Regeneration Time

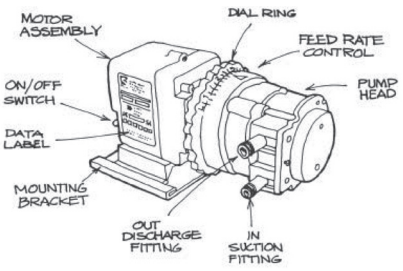
All filters and the softener should regenerate/backwash every three days. The time of regeneration/ backwash must be staggered to avoid having more than one unit backwashing at one time.

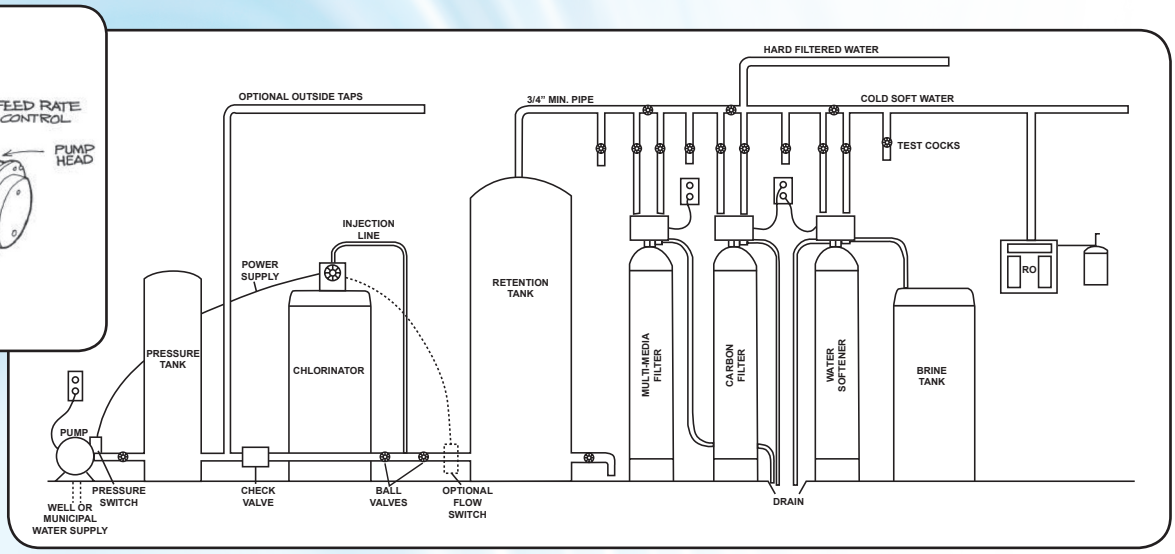
User Involvement

A problem water system requires testing and monitoring. The user must be aware of the chemical mixing procedure and how to test for residual chlorine at the test tap between the multi-media and carbon filters, etc. The chlorine tank must not run dry and lose the prime of the feed pump.

- The chlorinator is wired to the pump or flow switch
- The retention tank is sized for a minimum of 20 minutes retention
- Optional flow switch is to be used when outside unchlorinated water service is required
- Backwash and regeneration times must be staggered to ensure adequate water supply for proper regeneration

Chemical Feed Pump





Sizing the System

Sizing the Filters

When sizing the filtration components in a full line chlorination system, the basic rule for filtration applies - match the pump flow rates to the backwash rates and service flow rates. Remember 'Bigger is not always better and smaller is not right either.'

Sizing the Chemical Feeder Pump

Need to know:
Chlorine demand for water treatment

To do a chlorine demand test (should be performed on-site), you will need:

- 1 gallon of fresh raw water.
- Sample of chlorine which will be used in the system. Typically either 12.5% or 5.25% Sodium Hypochlorite or household bleach.

Chlorine test kit goal:

- To achieve a residual chlorine level of 1.0 - 1.5 ppm (free chlorine test).
- If used to precipitate hydrogen sulfide, a residual of 3 ppm should be obtained

Procedure:

- Add 3 drops chlorine to the gallon of raw water
- Allow to stand for 5 minutes.
- Test water with the chlorine test kit.
- If no chlorine residual is indicated, add more drops in sets of 3 until a chlorine residual of 1.0 - 1.5 ppm is obtained
- Measure the pumping rate of the pump system.
- Multiply the pumping rate by the number of drops of chlorine required. This will equal the number of drops of chlorine required per minute.

Example:

26 drops required
x 6 gpm pumping rate
= 156 drops per minute
x 60 minutes per hour
= 9,360 drops per hour
÷ 75,000 drops per gallon
= 0.125 gallons of chlorine per hour

Sizing the Chlorinator

Select a chlorinator which will run at approximately 30-80% injection.

Most chlorinators will inject more than required. Therefore, dilute the chlorine with 'clean' treated soft water to obtain the quantity required versus the pump's efficient setting.

Example: 0.125 gallons of chlorine required per hour.
The selected pump will inject 1.0 gallons per hour.

1.0 maximum output of chemical feed pump
÷ 50.0% optimum pump setting
= 0.5 gallons per hour
÷ 0.125 gallons per hour required
= 4.0

Your dilution ratio is 4:1.