



Ohio Department of Health Bureau of Environmental Health

Superchlorination Basics

Bob Taft, Governor
J. Nick Baird, MD, Director of Health

"To improve and protect the health of all Ohioans"

246 North High Street
Columbus, Ohio 43215

www.odh.state.oh.us
614/466-1390

Q: What is superchlorination?

A: If the initial attempts at chlorination fail to produce an acceptable bacteria result then more stringent techniques need to be used. Ohio Administrative Code (OAC) Section 3701-28-17(C) refers to this process as superchlorination. As stated, "superchlorination is the introduction of a chlorinated solution of not less than one thousand parts per million of chlorine into the well by one of the following methods:

1. Installation of an inflatable packer above the aquifer and the injection of chlorinated water into the aquifer under pressures greater than atmospheric;
2. The introduction of a volume of chlorinated water that is twice the total volume of water stored in the casing into the well to displace chlorinated water into the aquifer, or
3. Other methods approved in writing by the director.

Q: How is superchlorination done?

A: The first step is to calculate the amount of water that is present in the well. This is determined by subtracting the static water level from the total well depth. Use the difference and multiply by the number of gallons per foot of water as given in Table 1 to estimate the gallons present. For example, a six inch well that is 150 feet deep and has a static water level of 50 feet would have approximately 150 gallons of water in the well.

Diameter of well (inches)	Gallons per foot of water
3	0.37
4	0.65
5	1.0
6	1.5
8	2.6

The next step would be to mix a 1000 ppm chlorinated solution twice the volume of the well and introduce it either under pressure or by gravity. Using the previous example, we would need a 300 gallon tank. In order to obtain a 1000 ppm solution, use Table 2 and mix six gallons of chlorine for 300 gallons of water.

Table 2. Amount of Chlorine added to 100 gallons of water for disinfection			
Chlorine concentration (parts per million)	Gallons of 5.25% sodium hypochlorite – liquid bleach	Pounds of dry calcium hypochlorite	Minimum contact time (without pH adjustment)
250	0.5	.038	8 hours
500	1 gallon	0.75	8 hours
1000	2 gallons	1.5	8 hours

The next step is to introduce the solution into the well. Please keep in mind that an aquifer can receive as much water as it produces. Refer to the well log, if available, to determine the test rate (gallons per minute). The solution can now be delivered at a rate equal to that of the test rate. If the rate of delivery exceeds the test rate using an inflatable packer, the solution simply will not be able to be pumped. If the test rate is exceeded using gravity placement into the well, the solution will overflow the well and spill out on the ground. Chlorinated water introduced by gravity must be placed into the well rapidly as a large slug of water. This causes the water level in the well to rise higher than the water level in the aquifer, which forces chlorinated water to flow into the aquifer.

Another effective method is to place chlorine directly into the well and surge the solution in and out of the formation using a surge block. A surge block is a device that is attached to the drill stem of a cable tool rig. The rubber portion of the surge block fits snug to the inside of the casing. As the drill stem is lowered a pushing force is created and as it is raised a pulling force is created. (Imagine the plunger of a syringe)

Q: When should superchlorination be done?

A: According to OAC Section 3701-28-17(C), "when more than two samples test positive for total coliform or escherichia coli are collected from a well, the well shall be superchlorinated."

Q: Who can perform superchlorination?

A: Ideally, a PWS contractor should do the work. In general, they have the material and tools available to complete the task. A homeowner can attempt it. The method that would be easiest for them would be to use a tank and introduce the solution by gravity.

Q: What is the next step if superchlorination fails?

A: If superchlorination fails, the next step is to contact the ODH for assistance in investigating the system. As stated in OAC Section 3701-28-17(D), "If total coliform or escherichia coli are found in samples from the well after superchlorination, the department shall notify the director and shall undertake an investigation of the private water system to determine the source of contamination and approve possible remediation measures, including continuous disinfection as described in rule 3701-28-09 of the Administrative Code."

Questions? Contact the Residential Water and Sewage Staff at (614) 466-1390 or at beh@gw.odh.state.oh.us.