

Shock Chlorination Treatment

What should I do if my water is contaminated with bacteria?

First, don't panic! Bacterial contamination is common. Studies show that more than 40 percent of private water supplies are contaminated with coliform bacteria. These are common bacteria that have been inadvertently introduced into your well, and they can be removed. If your well is reported to have E. coli or fecal coliform bacteria, do not use the water and contact your local health department for guidance.

Shock chlorination is a one-time treatment designed to kill bacteria in the well and water system. Shock chlorination is the preferred disinfection treatment for private well systems because it is simple, cheap and effective for most situations. The amount of chlorine used in well treatment is determined by the well's diameter and depth of water. A 200 ppm solution of chlorine in the well and plumbing system for a period of at least 2 hours is desired - preferably overnight. Chlorine bleach is the most often use liquid chlorine (sodium hypochlorite) for domestic well disinfection. Unless you are confident about safely performing shock chlorination yourself, contact a licensed water well contractor to perform the procedure.

Step 1. Clean exterior and accessible interior surfaces. Turn off the electricity to the well and remove the well cap. Scrub the accessible interior surfaces of the cap with the chlorine solution (1 quart of chlorine laundry bleach per 5 gallons water), avoiding electrical connections. Replace a non-sanitary well cap with a sanitary well cap (<http://www.deq.mt.gov/wqinfo/swp/PDFs/SaniWellCapsVent.pdf>)

Step 2. Calculate the amount of chlorine needed. Determine the volume in the well and holding tank or cistern using Tables 1 and 2. Add 100 gallons for the water stored in the plumbing, pressure tank and water heater. Use Table 3 to determine how much chlorine is needed per 100 gallons of water in your well and plumbing system. For most homeowners, the cheapest and simplest method is to dilute common liquid bleach with water in a clean 5 gallon bucket.

(Note: Always wear protective clothes, gloves and goggles when handling chlorine, and work in a well ventilated area. If chlorine comes into contact with the skin, and especially the eyes, stop immediately and wash thoroughly with clean water.)

Well diameter (inches)	Storage per foot of water depth (gallons per foot)
2	0.16
3	0.37
4	0.65
5	1.02

6	1.47
8	2.61
10	4.08
12	5.87

Table 2. Capacity of storage tanks or cisterns.					
Depth (in feet)	Diameter of round cistern or length of side of square cistern (in feet)				
	6	7	8	9	10
Round type	Cistern capacity, gallons				
5	1,055	1,440	1,880	2,380	2,935
6	1,266	1,728	2,256	2,856	3,522
7	1,477	2,016	2,632	3,332	4,109
8	1,688	2,304	3,008	3,808	4,696
9	1,899	2,592	3,384	4,284	5,283
10	2,110	2,592	3,760	4,760	5,870
Per foot of depth	211	288	376	476	587
Square type	Cistern capacity, gallons				
5	1,345	1,835	2,395	3,030	3,740
6	1,614	2,202	2,874	3,636	4,488
7	1,883	2,569	3,353	4,242	5,236
8	2,152	2,936	3,832	4,848	5,984
9	2,421	3,303	4,311	5,454	6,732
10	2,690	3,670	4,790	6,060	7,480
Per foot of depth	269	367	479	606	748

Example:

You have a 6-inch diameter well casing that is 150 feet deep and it is 50 feet to the static water level (the water level when not pumping). From Table 1 you estimate that you have approximately 150 gallons of water stored in the well casing (100 feet of water x 1.47 gal per foot of 6" pipe = 147 gallons). Add an additional 100 gallons for the plumbing system (150 + 100 = 250 gallons of water needing treatment). From Table 3, you determine that 3 pints of household bleach are needed per 100 gallons of system capacity.

$$250 \text{ gallons capacity} \times \frac{3 \text{ pt bleach}}{100 \text{ gallons capacity}} = 7.5 \text{ pt bleach}$$

Table 3. Chlorine mix ratio for a 200 ppm solution.		
Chlorine Product	% Active Chlorine	Amount needed for 200 ppm solution
Liquid laundry bleach	5.25%	3 pt/100 gallon

Step 3. Add the chlorine solution to the well and circulate. Pour the diluted chlorine solution into the well (it is still open because you already cleaned the well cap). Turn on the electricity. Next, use a hose that is connected as near to the well as possible and run water back down the well for at least 15 to 20 minutes to recirculate the chlorinated water. Thoroughly rinse the sides of the well casing and the pitless adapter during recirculation. Wash the well interior but **avoid electrical wiring and connections.**

Step 4. Disinfect the household plumbing. Before disinfecting the household plumbing system, disconnect or bypass any carbon filters or reverse osmosis equipment. Next, open the cold and hot water faucets, one at a time, and let the water run until a strong chlorine odor is detected from each faucet. Flush toilets until chlorine odor is apparent. Once the chlorine has reached all points in the system, allow it to stand undisturbed overnight. Turn off the hot water heater during this time and be sure the house is well-ventilated.

Step 5. Flush the system. The next morning, use an outdoor hydrant or faucet to flush the chlorinated water out of the system onto a safe area where desirable vegetation will not be harmed, such as a gravel driveway far away from any surface water or stream. Chlorine will evaporate to harmless levels within one to two days. Do not allow more than 100 gallons of chlorine-treated water to enter the septic system. After the chlorine is drained from the system, run water through the taps until the strong chlorine odor is gone. A slight residual chlorine taste and odor will likely remain in the water for a couple days. The water should now be safe for human consumption; however, it is advisable to retest the water for bacteria after one week to ensure the problem is resolved. You may need to clean faucet aerators or valves on the water system to remove any debris broken loose during the disinfection process.