

Disinfection Procedure for Private Wells

Publication # 27

All new or repaired wells should be routinely disinfected prior to use of the water system. A water system should also be disinfected following plumbing repairs or modifications, as internal piping may have been exposed to contamination. All wells at some point need to be properly disinfected to ensure the bacteriological quality of the well is satisfactory.

When should you consider disinfecting your well?

- Whenever an unsatisfactory bacteriological result has been received from your water.
- When the well cap has been taken off the well exposing the well casing interior.
- If the well is flooded.
- Whenever the water system plumbing has been exposed to potentially unsanitary conditions

In the case of a new well, try to coordinate between the well driller, pump installer and the contractor-plumber (if applicable). That way disinfection of the system along with pressure and leak tests can be performed at the same time. The chance of contamination is less likely to occur if there is no long delay between the time the well is drilled and the time the pump installer completes the connection from the well to the house plumbing. Note that Section 19-13-B51k of the Connecticut Public Health Code (PHC) requires disinfection of each new well system before use.

Prior to disinfection the entire well and piping system must be flushed so that the well is purged of any sediment, foreign matter, or corrosion materials (due to incomplete development, unsanitary construction, or long idleness of the well). These substances can react with chlorine and decrease its effectiveness in destroying harmful bacteria and organic materials.

1. Prepare a chlorine solution by mixing the required amount of chlorine to about 10 gallons of water. For effective disinfection, a minimum of 50 parts per million (ppm) chlorine dosage is specified. See Tables 1 and 2 and "Examples" for the recommended amount of chlorine containing compound needed to obtain the required 50-ppm dosage. Note: For a typical 6 inch well of about 100-300 foot depth, approximately 4oz. of 70% available chlorine granules (HTH) or 1.0 quart of household 5.25% bleach (e.g. Clorox) would be needed.
2. Pour the 10-gallon chlorine solution down the well casing.
3. Open every hot and cold-water faucet and tap in the plumbing system until the chlorine odor is noticed in each outlet; then close the taps. During this time, it is important that all internal parts of the water system come in contact with the chlorinated water, including hot water tanks (if installed). If there are large non-pressure or pressure storage tanks (used in a community well supply) in the water system, they should be temporarily waterlogged to assure that all water-contact surfaces are chlorinated adequately.
4. With the use of a hose connected to a nearby sill cock, recirculate some of the chlorinated water into the well casing while rinsing the interior surfaces of the casing at the same time. This will disinfect the casing as well as diluting the concentration of chlorine in the well itself. (High concentrations of chlorine could attack the concrete grout between the tile sections of a dug well).
5. Replace the sanitary seal and cover the well casing so that the system cannot be subsequently contaminated.
6. Allow the chlorinated water to stand idle in the well and piping system for at least three hours, preferably overnight.
7. After the contact time has ended, flush the chlorinated water from the system. An outside faucet may be used to flush the water to waste, however, care should be taken to avoid contact

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of chlorinated water with the grass and shrubbery. (In a small well supply, it may take a few days to remove all the chlorine from the system). Be careful not to over tax a low-yielding well. It is also a good idea to flush out any hot water or storage tanks at this time to remove any sediment or oxidation products.

Drilled vs. Dug Wells

Most private wells are either drilled or dug. In the case of a drilled well, the current PHC requires the steel casing to extend a minimum of six inches above the established grade. It should also be outfitted with a certified watertight well cap with screened vent, as is specified in Section 19-13-B51 (j)(b) of the PHC. The Water Systems Council (WSC) website (www.watersystems council.org) lists currently approved products for wells. We also recommend that any existing well pit be eliminated and the well casing raised to a minimum of six inches above established grade. The WSC website offers guidance for this.

Dug wells are “high risk” meaning they are typically not constructed watertight and allow for the entrance of surface water, insects, and rodents. Dug wells should be inspected and repaired prior to disinfection and then tightly sealed after disinfection. Owners of dug wells should give serious consideration to connecting to a public water system, if available. If this is not possible, a properly constructed drilled well should also be considered.

Bacteriological Test

Before a water sample is collected for bacterial analysis, it is very important that there be no trace of chlorine left in the water supply. One can use a simple chlorine test kit, available from most swimming pool suppliers, to determine the absence of chlorine in the water. Certified laboratories are required to reject samples for bacterial analysis if a chlorine residual is present.

Once the chlorine is absent from the water system, a sample is collected in a sterile bottle. The bottle should be obtained from the state certified laboratory that will perform the analysis. Laboratories will supply written sampling instructions or, in some cases, collect the sample for the homeowner.

The effectiveness of the disinfection and safety of the water supply for drinking purposes is shown if the test results indicate an absence of coliform bacteria.

Note: If the test is found positive for coliform bacteria, a resample should be collected to confirm the first test. We recommend the laboratory method used to determine the coliforms in the resample allow for enumeration of the bacteria (e.g. the results give the number of colonies, not just presence or absence). It is also advisable to determine the heterotrophic plate count at the same time on order to assess the degree of possible contamination. See the article entitled *Recommendations for Sampling Private Wells for Bacteria for more information*. Occasional positive tests can occur result from improper sampling technique or other chance contamination. If the resample test is again unsatisfactory, the disinfecting and sampling should be repeated.

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Table 1

VOLUME OF WATER PER FOOT OF PIPE

Pipe Diameter	Gallons/ foot of pipe	Pipe Diameter	Gallons/ foot of pipe
2.5 "	0.254	24"	23.4
4"	0.672	30"	36.6
6"	1.47	36"	52.6
8"	2.61	42"	71.6
10"	4.08	48"	93.6
12"	5.86	54"	119
16"	10.4	60"	146
18"	13.2	72"	211

Table 2

TABLE OF DOSAGE OF DISINFECTANT FOR VARIOUS VOLUMES OF WATER APPROXIMATE
 CHLORINE DOSAGE TO PRODUCE 50-PPM AVAILABLE CHLORINE

Volume of Water (Gallons)	Dry Calcium Hypochlorite (HTH, Perchloron or similar compound with 70% available chlorine)	# of 5-gram Tablets	Liquid 5.25% Sodium Hypochlorite (Clorox or similar unscented household bleach)
50	0.5 oz	3	5 fl. oz
100	1.0 oz	6	11 fl. oz
150	1.5 oz	9	16 fl. oz
200	2.0 oz	12	22 fl. oz
300	3.0 oz	17	1 qt.
500	5.0 oz	28	2 qt.
1000	10 oz	56	1 gal.
2000	1 lb. 3 oz.		2 gal.
3000	1 lb. 13 oz.		3 gal.
4000	2 lbs. 7 oz.		4 gal.
5000	3 lbs.		5 gal.
10,000	6 lbs.		10 gal.
25,000	15 lbs.		25 gal.
50,000	30 lbs.		50 gal.
100,000	60 lbs.		100 gal.

Note: 1 quart = 32 fl.oz and 1 gallon = 4 quarts)

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Example A

Given: 6" drilled well, Depth – 500 feet

Calculations: (from Table 1)

500 feet x 1.47 gallons per feet = 735 gallons of water to be disinfected

Dosage Required: 50 ppm Chlorine

Use: (from Table 2)

7.5 oz. of 70% Calcium Hypochlorite; or

42 tablets (5 grams each); or

approximately 3 quarts liquid household bleach.

Example B:

Given: 36" dug well, depth-20'

Calculations: (from Table 1)

20 feet x 52.6 gallons per foot = 1052 gallons of water to be disinfected.

Dosage Required: 50-ppm chlorine

Use: (from Table 2)

10 oz. of 70% Calcium Hypochlorite; or

56 tablets (5 grams each); or

approximately 1-gallon liquid household bleach.

Example C:

Given: Community well water supply, with same well as in "Example B" (1052 gallons); and 1-10,000 gallon non-pressure tank; and 1-5,000 gallon pressure tank

Calculations: Total volume to be disinfected = 1052 gallons + 10,000 gallons + 5,000 gallons = 16,052 gallons

Dosage Required: 50 ppm chlorine

Use: (from Table 2)

9 lbs. 10 oz. of 70% Calcium Hypochlorite

NOTE: In cases where a large concentration of chorine is required (e.g. Example 3), it is suggested that the dosage applied be staggered, i.e., 5 portions of 2 lbs. HTH per each 10 gallons of solution water over a period of time.