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Permanent Pressure Control for Water Systems

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Permanent Pressure Control for Water Systems

Paul E. Johnson, Extension Agricultural Engineer

Ever since the first water pump and pressure systems were introduced around the turn of the century, water system tanks have been the source of one particularly persistent problem. Over a period of time, a tank becomes *waterlogged.* This causes the water pump to "short cycle," resulting in shorter motor life and frequent switch failure.

Until recently, it has been necessary to "recharge" a waterlogged tank with air, either (1) by pumping air in with the water so it would collect in the top of the tank and become compressed, (2) by draining the tank and allowing air to enter, or (3) by adding air with an air compressor. Often the air inlet controls have failed to operate properly because of rust and corrosion. This soon leads to waterlogging and subsequent pump failure.

PRE-PRESSURIZED WATER TANKS

Pre-pressurized water tanks are now on the market that eliminate the problem of waterlogging. These units have a permanent air charge sealed in with either a flexible diaphragm (Figure 1) or a vinyl air cell (Figure 2). They can never waterlog as long as the diaphragm or the air cell is not damaged. These units also eliminate the need for initial air charging as well as secondary or additional charging later on. The air cushion, injected at the factory, never needs replacing.

The air pressure in a pre-pressurized tank can be altered very easily to fit the need. The air charge, expressed as pounds per square inch (psi), should be the same as the cut-in pressure of the pressure switch. For example, a charge of 20 psi is correct for use with a pump cut-in setting of 20 psi on the pressure switch, while 30 psi would be correct for a 30-50 psi pressure switch setting. Matching air charge with cut-in pressure can be done simply by adding air or releasing air through the valve stem.

Use of a non-corrosive flexible diaphragm or vinyl air sac in pre-pressurized tanks allows the lower water chamber or reservoir to be separated and entirely sealed from the upper air chamber. This eliminates introduction of air directly into the water, thus minimizing the problem of rust in water. Most iron in well water is in solution. Initially, the water is clear; but when it comes into contact with air, the iron is oxidized and the water becomes cloudy. With a pre-pressurized tank, this cannot occur since the water is never in contact with the air.

Another advantage of the new pressurized tanks is that a small one of these units will do the job of a much larger conventional tank. For example, an 18- to 20-gallon pre-pressurized unit is considered equivalent to a 42-gallon conventional system. Because of this advantage of smaller size and weight, together with a permanent air charge sealed in, pre-pressurized tanks can be installed almost anywhere in the well system — from on or near the pump, to an area away from the pump, such as in a closet or under the stairs.

These units are also ideal for the one who must drain his system to avoid winter freeze-up. Since a pressurized tank retains its charge after draining, there is no need for recharging each time the system is put back into operation.

Pre-pressurized water system units are available in sizes to handle nearly any "drawdown" desired, from 1 to 150 gallons. Because the air cushion in the tank is permanent, the drawdown does not vary. This, plus the fact that the tank cannot become waterlogged, promotes longer pump life because the cycling rate does not increase.

SOURCES OF ADDITIONAL INFORMATION

For more complete information on the different types of pre-pressurized water system tanks now available, check with several plumbing contractors and/or plumbing supply houses in your area. And for assistance in evaluating your present water system or in planning a new one, contact your local County Extension Office.

Also available free of charge to Indiana residents are the following related Purdue Extension publications:

"Chlorination of Private Water Supplies" (M-156)
"Connecting Onto a Rural Community Water System" (AE-73)
"Iron Water Control in the Home" (Ext. Cir. 507)
"Prevent Water System Failures" (AE-74)
"Private Water Systems" (MWPS-14) $1.00
"Soft Water for the Home" (HE-506)
"Sulfur Water Control for the Home" (Ext. Cir. 517)

Single copies may be obtained from your County Extension Office or from the CES Mailing Room, AGAD Building, Purdue University, West Lafayette, Indiana 47907.

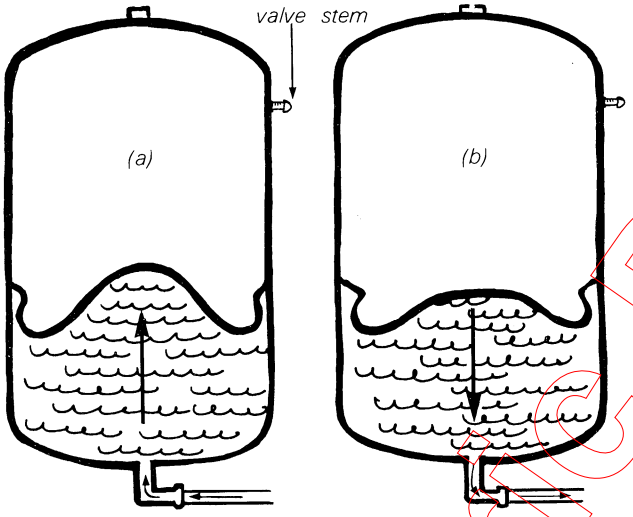

Figure 1. Flexible Diaphragm-Type Pressure Tank. (a) When the pump starts, water under pressure goes into the lower reservoir, forcing the diaphragm up and compressing the air cushion. (b) When water is drawn from the system at any faucet or hydrant, the air cushion expands, pushing down on the diaphragm and expelling the water from the tank.

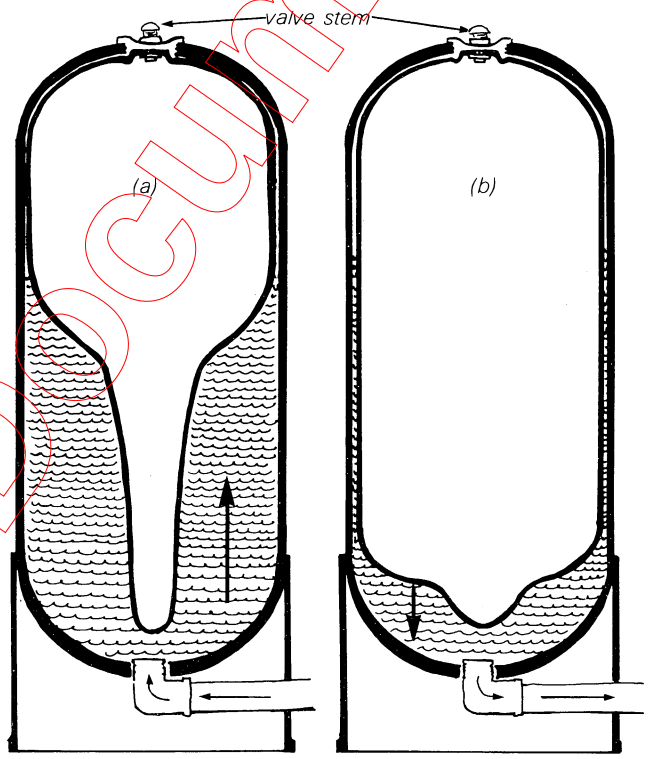

Figure 2. Air-Cell Pressurized Tank. (a) The pump forces water into the tank, compressing the air cell. (b) As water is withdrawn from any fixture, the air cell expands forcing the water from the tank.

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