



BURIED PRESSURE TANK PUMPING EQUIPMENT INSTALLATION GUIDANCE

Background

Most well installations in Michigan allow for the pressure tank to be installed in a protected location, such as a basement, crawlspace, or well house. However, there are situations (e.g., mobile homes) where no protected location exists. In those instances, pressure tanks are usually buried. Pressure tanks have been buried in Michigan for decades and 550 to 650 are installed annually. While Part 127, 1976 PA 368, as amended, Michigan Water Well Construction and Pump Installation Code (Code) clearly states that buried pressure tanks are allowed, the Code does not clearly state where the accompanying pumping equipment (switch, pressure control line, etc.) can be located. This has created a regulatory dilemma for local health departments and has resulted in contractors installing the equipment in varying locations, such as within the well casing, on top of the well cap, in a secondary casing above grade, in a secondary casing below grade, in a culvert below grade, or buried directly in the soil. Experience shows that not all buried pressure tank installations are effective. The following may be considered best practices developed by well drilling contractors throughout Michigan.

Well Code Requirements

Rule 156 of the Code allows for a buried pressure tank installation, provided it is totally buried (not located in a below-grade structure or pit).

Rule 104 of the Code defines “pumping equipment” as equipment or materials that are used or intended to assist a pump in withdrawing groundwater from a well, including any of the following: seals and other safeguards to protect the water from contamination, associated fittings, intake and discharge piping, and controls to provide water storage facilities and deliver water to a distribution piping system. A pressure tank switch and attached pressure control line meet the definition of pumping equipment.

Rule 151 of the Code states that pumping equipment can be installed in an approved pump room, well house, crawl space, basement offset, or basement. The pressure control line (device that is connected from the service line or pitless adapter to the pressure switch) still must be installed below grade, whether the pressure switch is located inside the casing, on top of the well cap, or inside a secondary casing. In some installations the pressure control line is hooked to the air valve at the top of the tank.

Three Common Installation Methods

Since the pressure switch should be installed close to the pressure tank, the pressure control line is either attached to the pitless adapter on the inside of the casing or attached to the service line outside of the casing. Some installations allow the pressure switch to be installed inside the home or in crawl space under the home. Below is a brief description of these methods.

Pitless Adapter Installation

When the pressure switch is attached to the pitless adapter, a hole is drilled in the pitless adapter and the pressure control line attached. Contractors will try to locate the pressure tank next to the well to

help reduce pressure fluctuation. The switch is then either mounted on top of the well cap or placed inside the well casing above grade level.

Unfortunately, contractors have found that installing the pressure switch inside of the humid well casing can result in early failure of the switch. This installation is further complicated since some contractors end up having to remove the drop pipe and bridge above the pitless adapter to allow for room to place the pressure switch inside the casing.

Therefore, most contractors mount the switch on top of the well cap. This requires a specific well cap manufactured for attaching the switch, and the pressure switch used for this application should carry a NEMA 3 or 3R rating. See photos below of approved installations.



Service Line Installation

When the pressure control line is attached to the service line outside the well, the pressure control line and switch are either completely buried in soil or housed inside of a structure or secondary casing above or below grade.

Some contractors will install a pitless adapter on the secondary casing and attach the pressure control line to the service line inside of that casing. This can be done in a sanitary manner because there is no soil contact between the service line connection and the pressure switch above grade. See photos below of installations.



House or Crawlspace Installation

Some installations allow for the tank to be buried and the controls to be installed in the house or crawlspace. In these instances, the tank may be buried near the home or a buffer tank or an anti-pulsation device may be used. A buffer tank and a pulsation plug protect the pressure switch components from a system that may experience water hammer. See photos below of approved installations.



Sampling Taps

Buried tank systems can pose a challenge regarding the installation of sampling taps. The Code requires the installation of a sampling tap at the pressure tank or as near to the well as possible. Oftentimes, buried tank installations do not allow for a sanitary location to install a sampling tap and instead an existing tap is designated as the sample tap. If a contractor chooses to not install a new sampling tap on a buried tank system, an existing tap needs to be designated as the sampling tap and the contractor is then liable for water samples collected from the distribution system.

While the Code requires the installation of a pressure relief valve when the pump is capable of exceeding the working pressure of the pressure tank, installation of a PRV on a buried tank installation is not required. Since the tank is buried, there is no safety concern if the tank's integrity becomes compromised.

Electrical Requirements

To be safe, compliant with the National Electrical Code (NEC) and to maximize the life of a buried tank system, there are some basic guidelines that should be followed when installing a buried tank system.

1. All electrical components should carry the proper NEMA rating for their application. For example, standard pressure switches carry a NEMA I rating and should not be installed outdoors in direct contact with weather conditions.
2. An electrical disconnect should be installed within 50 feet or within site of the pressure switch location.
3. All wiring should be installed in approved conduit.
4. Any wiring into disconnects or pressure switches should terminate into the enclosure using approved connections that are watertight and vermin proof.
5. Electrical components such as pressure switches should not be buried in direct contact with soil in an area subject to flooding from groundwater, unless the components carry the proper NEMA rating.

If you have concerns regarding the electrical code or the integrity of the electrical components of a buried tank installation, you should contact your local electrical inspector.

Examples of Non-Approved Installations:

Both installations below are not approved. Below left photo shows a pressure switch and control line that are in direct contact with soil and subject to flooding. The switch is rated NEMA I for indoor use only.

Below right photo shows where a pipe was installed over the switch at the wellhead. The pipe did not seal the pressure switch or switch control line from direct contact with the soil or prevent flooding from groundwater.



Recommendations

All three installation methods can be accomplished in a sanitary manner. If the pressure control line is attached to the pitless adapter, the switch shall be either mounted to the well cap or tucked inside of the well casing.

If the pressure control line is attached to the service line, the pressure control line shall be completely encased within an outer pipe so that there is no direct contact with the soil. Attaching the pressure control line to the service line and burying it directly in the soil is not approved (unless the control line is specifically designed for the purpose and approved in writing by the local health department).

Any pipes or devices used to house a pressure switch, or a pressure control line shall be completely sealed from soil or groundwater intrusion. Pressure switches or controls installed in pipes or devices that are below ground should allow the components to be serviced above grade without excavation.

The best practices installation methods depicted in this document are not intended to be all inclusive. If a water well contractor has an alternative method of installing the buried tank components in a sanitary manner that complies with the electrical code, the local health department can evaluate that installation for compliance.

This document was a joint effort of the Department of Environment, Great Lakes, and Energy (EGLE), water well industry, and local health departments.