

Drinking Water Tech Tips:

Pump House Piping

Many people ask us to recommend a layout for the valves, pipes, and other components in a pump house. Systems vary, but to function properly some components need a specific order and location.

For example, locate sample taps where you can flush them for at least five minutes before sampling. Use smooth-nosed sample taps without interior or exterior threads, and make sure there is enough room to collect samples.

The back of this *Tech Tip* shows a typical small system with a submersible pump. The numbers correspond with the list below. *The diagram is guidance, not a design recommendation. Licensed engineers must design new Group A water systems and we must approve them.*

Wellhead piping requirements:

- Anchored to prevent excessive movement.
- Protected against surge or water hammer.
- Designed for low friction loss.
- Protected against physical damage and freezing.
- Equipped with valves to test pumps and control wells.

We recommend that pipe configurations:

- Minimize the potential for source contamination.
- Facilitate emergency response.
- Provide for proper testing and control of the well.
- Enhance system reliability.
- Allow water-level measures in the completed well.
- Provide for ease of repair, inspection, or maintenance.

Systems vary widely. In general, components work best in the following order:

1. **Check Valve:** Install immediately after the well pump to prevent any potentially contaminated water from flowing back into the well when the pump is not running.
2. **Raw Water Sample Tap:** Install downstream of a check valve for collecting water samples directly from the source before any treatment or water storage facilities. To ensure your raw water sample is from the source, make sure the pump is running when you collect the sample.
3. **Pressure Switch:** Install downstream of the check valve. It signals the source pump when to start and stop. The closer it is to the source pump, the better it will work. If you use a **pressure gauge** to measure static pressure in the waterline, install it where it is easy to read.
4. **Isolation Valve:** Install before and after the flow meter and any other component you may have to remove for repair or replacement.
5. **Flow Meter:** Also called the source meter. Install after the check valve and before the discharge-to-waste line so it measures all the water the well produces. It is important to follow the manufacturer's specifications to ensure accurate measurement.
6. **Isolation Valve:** Install after the flow meter and any other component you may have to remove for repair or replacement. You may use unions for a quick and easy way to disconnect flow meters, pressure tanks, booster pumps, and other components.

7. **Chlorine Injection Site:** Install downstream from the check valve, flow meter, raw water sample tap, and discharge-to-waste line. Place the site upstream of any storage facilities to increase contact time.
8. **Discharge to Waste Line:** Install after the flow meter so you can flush the well without directing water to customers. Do not connect the line directly to a sewer or storm drain. You must locate end pipes where you can routinely inspect them and protect the opening with a screen, flap valve, or duckbill valve.
9. **Pressure Relief Valve:** Must be close to the pressure tank. You may place additional valves anywhere to protect the well house piping and components from excessive pressure.
10. **Finished Water Sample Tap:** Install downstream from any chemical injection point.
11. **Shut-off Valve:** Isolates the well house piping from the rest of the system. Install where water leaves the pump house to enter the distribution system.

Typical pump house piping for a small water system

