

HOW TO DETECT RELEASES IN UNDERGROUND PIPING SYSTEMS

State and federal regulations require owners and operators of underground storage tank (UST) systems to test their tanks and associated underground piping for releases. Many releases occur through the piping system. All regulated UST systems must perform release detection according to the schedules described in the Storage Tank Regulations.

Piping systems consist of the pump (if any), pipes and associated equipment used to dispense or convey regulated substances from USTs. There are two types of underground piping systems: pressurized and suction. In a pressurized system, the product is essentially “pushed” through the piping to the point of end use, such as the dispenser at a service station. A suction system normally uses a pump at or near the point of end use to “draw” the product from the tank to the pump.

Pressurized systems commonly use a submerged, centrifugal pump located inside the tank. The product is essentially “pushed” through the piping to the point of end use, such as the dispenser. If a break occurs in pressurized piping, a very large release can occur rapidly because the pump continues to push the product through the damaged piping. The actual leak rate will depend on the amount of positive pressure on the lines.

Suction systems typically use a pump at or near the point of end use to “draw” the product from the tank to the pump. The pump creates a lower pressure in the piping at the end point to allow atmospheric pressure to push the product along the suction piping to the pump chamber where it is discharged to the end use.

There are two types of suction systems, known as either European or American systems. In the European system, there is no check valve, or a single check valve is located immediately below the pump. In the American system, a check valve is generally located either near the top of the tank (an angle check) or at the bottom of the suction line within the tank (a foot valve). Emergency generator systems are generally either European or American suction depending on system design.

Release Detection Methods

European suction systems - No additional release detection is needed for a system that meets the following criteria:

- Operates at less than atmospheric pressure;
- Is properly sloped to allow product to drain back into the tank when suction is broken;
- No more than one check valve is located directly below and close to suction pump; and
- Compliance with the above criteria is easily determined.

American suction systems (installed or replaced on or before November 10, 2007) - Must use one of the following release detection methods:

- Line tightness test every three years (0.1 gallon per hour);
- Monthly interstitial monitoring;
- Monthly vapor monitoring;
- Monthly groundwater monitoring; or
- Monthly statistical inventory reconciliation.

American and European suction systems (installed or replaced after November 10, 2007) -

- Systems must have total secondary containment - Double-walled piping, dispenser pans, and tank top sumps; and
- Monthly interstitial monitoring is required (American suction systems only).

Pressurized systems (installed or replaced on or before November 10, 2007) - must be equipped with an automatic line leak detector which is tested annually, and also be monitored using one of the following leak detection methods capable of detecting small releases:

- Annual line tightness test (0.1 gallon per hour);
- Monthly interstitial monitoring;
- Monthly line leak test (0.2 gallons per hour);
- Monthly vapor monitoring;
- Monthly groundwater monitoring; or
- Monthly statistical inventory reconciliation.

Pressurized systems (installed or replaced after November 10, 2007) - must use the following:

- An automatic line leak detector, which is tested annually, that shuts off the pump (except for emergency generator UST systems) when a release is detected;
- Monthly interstitial monitoring; and
- Three-year tightness testing of containment sumps.

Line Leak Detectors

Line leak detectors are methods of finding large leaks (three gallons per hour within one hour) in pressurized piping. These methods must provide continuous monitoring of the piping system. On older systems, line leak detectors may restrict flow, shut off flow, or alert the operator with an audible or visual alarm. New systems are required to shut off the pump. Owners and operators of USTs which supply fuel to emergency generators must install a line leak detection method that will trigger an audible or visual alarm but will not restrict or shut off flow. Line leak detectors must be tested annually to ensure that they will function should a leak occur.

Mechanical line leak detectors are self-contained mechanical devices installed in or immediately adjacent to the pump manifold assembly. They slow the flow of product if a leak occurs. These devices do not entirely shut off the flow of product. Switches may be added to some mechanical devices to shut off the pump.

Electronic line leak detectors usually monitor the pressure change in a pipe when the pump turns on or off. The pressure will change differently in a tight line than in a leaking line. Electronic systems may be tied to the pump controls to shut off flow and/or be tied to an alarm to alert the operator.

Continuous interstitial monitoring may be provided by sensors installed in containment sumps which are designed to collect any product lost from a piping system. The sensors can be connected so that flow is shut off and/or an alarm is activated when a leak is detected. Sensors must be tested annually and maintained in accordance with the manufacturer's technical literature.

For more information on the different release detection methods for piping systems, consult industry experts (tank or piping manufacturers, petroleum equipment dealers, DEP-certified installers or inspectors, or industry associations) or consult the United States Environmental Protection Agency publication *Straight Talk on Tanks*.

For more information, visit www.dep.pa.gov, Businesses > Land > Storage Tanks.