

PIPING: DOUBLE-WALLED SYSTEMS

Double-walled piping systems consist of pipes within pipes and are designed to prevent releases into the environment by containing leaked fuel in the “interstitial space” created between the two walls of the pipe.

There are two types of double-walled pipe:

- ▶ **Rigid piping** made of fiberglass-reinforced plastic (FRP).
- ▶ **Flexible piping**, typically constructed of multiple layers of various plastics.

Double-walled piping systems come in two categories:

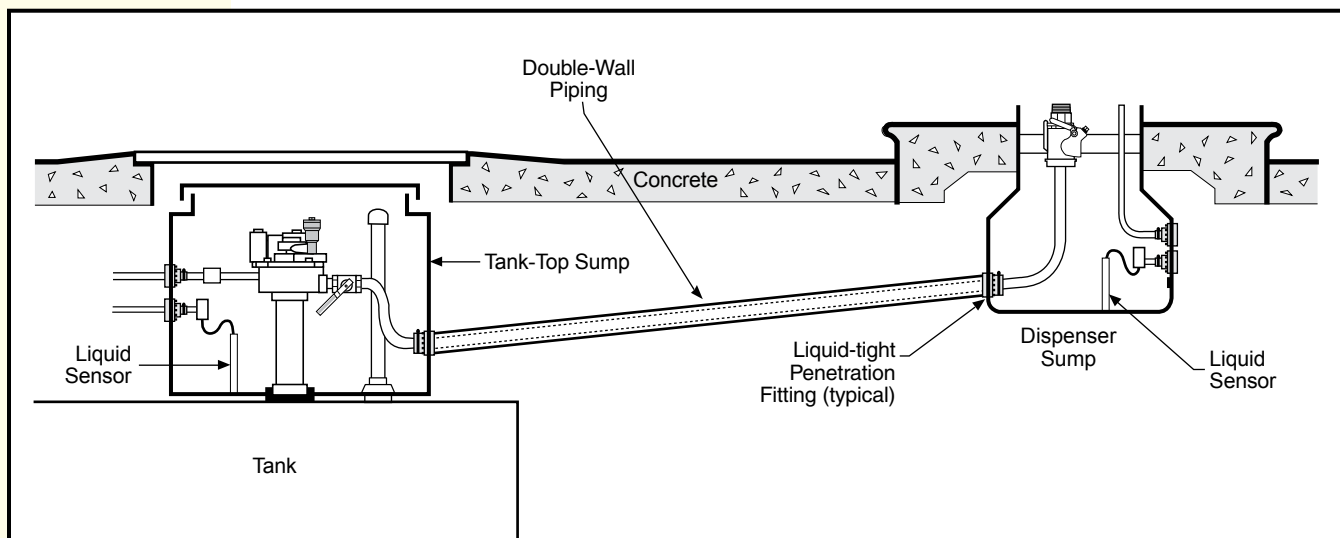
- ▶ **Ducted pipe**, which has a large-diameter (4 inch) outer wall and a smaller-diameter (2 inch) inner pipe. If flexible piping is used to construct the ducted system, the inner pipe slides inside the outer pipe so the inner pipe can be removed and replaced without excavation.
- ▶ **Coaxial pipe**, which has an outer wall that fits snugly over the inner pipe. The two walls of coaxial pipe are manufactured together at the factory and installed as a unit. In some cases, coaxial pipe is installed within a larger-diameter duct to permit replacement of the coaxial pipe without excavation.

To be sure that all the fuel-carrying components of the piping system are contained, a double-walled piping system also includes liquid-tight containers known as “sumps” that are located beneath the dispensers (dispenser sumps) and where the piping connects to the pump at the tank top (tank-top sumps). Sumps are typically made of fiberglass or polyethylene plastic.

Underground storage system piping that does not routinely contain fuel (e.g., vent lines, fill pipes) is typically of single-walled construction, even for double-walled storage systems.

Since September 1991, double-walled piping has been required for all piping that routinely contains fuel, except for properly sloped suction systems (see *TankSmart* Piping: Suction Pumping Systems module). Leak detection for double-walled piping is known as interstitial monitoring. Since September 1991, sensors must be used to continuously monitor for leaks in interstitial spaces. Periodic visual inspection of sumps is not allowed for piping installed after September of 1991.

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DIAGRAM OF A DOUBLE-WALLED PRESSURIZED PIPING SYSTEM. Any fuel leakage that occurs in the piping itself will flow down to the tank-top sump where the liquid sensor will trigger an alarm inside the facility. Leaks from piping components at the tank top are contained in the tank-top sump, while leaks from the dispenser are contained in the dispenser sump.

HOW DOES INTERSTITIAL MONITORING DETECT LEAKS IN PIPING?

Interstitial monitoring is about detecting the presence of liquid in sumps with the use of sensors.

Interstitial monitoring is about detecting the presence of liquid in sumps with the use of sensors. In double-walled piping, the tank-top sump (the liquid-tight containment area on top of the tank) usually serves both as the low point for the piping run and the containment for the pump. A dispenser sump (the liquid-tight containment under the dispenser) captures and contains any leaks from inside the dispenser cabinet.

Most interstitial monitoring is conducted using sensors that are connected to an automatic tank gauge (ATG) that continuously monitors for leaks and also serves as an alarm console for the sensors. There are a few sensors on the market that are connected to a stand-alone release-detection console that has no other functions. In either case, sensors will trigger an alarm at the ATG or release-detection console whenever the sensor detects liquid.

There are two types of sensors: discriminating and non-discriminating. A discriminating sensor can tell the difference between fuel and water and provides a different alarm for each type of liquid. A non-discriminating sensor, by far the most commonly used, only tells you that a liquid is present. With non-discriminating sensors you have to visually investigate to determine whether fuel or water has triggered the alarm.

You should keep a list of all the sensor locations with the sensor identification number or label posted close to the ATG or release-detection monitor so you (and the service technician) can quickly tell which part of your piping system is causing the alarm.

Interstitial monitoring is the only release-detection method that can actually PREVENT a leak if the operator is paying attention to the alarms. The biggest issue with interstitial monitoring is:

OPERATORS NOT PAYING ATTENTION TO ALARMS!

Not all alarms are due to leaks, but ignoring any alarm defeats the purpose of having a leak-monitoring system. Large leaks have gone undetected when operators ignored an alarm. Most ATGs and leak consoles indicate alarms with audible beeping or a horn and an illuminated red light. Systems with digital displays also describe the alarm (e.g., L1: Fuel Alarm indicates liquid is present at the location where sensor L1 is installed). Respond immediately to any audible alarm or blinking red or yellow lights! If you do not know what to do, call your service technician or the Maine DEP.

Other problems with interstitial monitoring include the following:

- Water gets into the tank-top sump, causing nuisance alarms. If you have frequent nuisance alarms due to water, consult with your service technician to figure out how to fix the problem.
- Sumps are not liquid tight, so leaks escape to the environment before the sensors detect them. Testing sumps periodically to be sure they are tight is not presently required by regulation, but is a good idea.

WHAT DO YOU DO IF YOUR ELECTRONIC MONITOR ALARMS?

If your ATG or release-detection console is in alarm, take the following steps:

- ▶ If the alarm is in a tank-top sump, stop pumping the grade of fuel where the alarm is located. If the alarm is in a dispenser sump, stop pumping all grades of fuel present in the dispenser.
- ▶ Contact your service technician immediately to determine the cause of the alarm.
- ▶ Report alarms, fuel, or water in sumps to the DEP within 24 hours. Call 207-287-2651 during business hours, or 1-800-482-0777 anytime.

To ensure your sensors are working properly and your sumps are in good condition, they must be inspected as part of your annual inspection by a Maine-certified tank installer or inspector.

The biggest issue with interstitial monitoring is: Operators not paying attention to alarms!

WHAT DO YOU DO IF YOU HAVE MANUAL MONITORING?

In Maine, there are a small number of double-walled facilities that were installed **before September 1991** and are not required to have continuous electronic monitoring. If you have such a system, you are required to monitor your sumps manually, reconcile daily inventory, and conduct annual statistical inventory analysis (SIA). (See the *TankSmart* Daily Inventory & Statistical Inventory Analysis module.)

If you have double-walled piping without continuous electronic monitoring, you are required to monitor your sumps manually, reconcile daily inventory, and conduct annual statistical inventory analysis (SIA).

If you are manually monitoring your sumps, you are required to:

- Open each sump WEEKLY to visually inspect for fuel or water.
- Contact your service technician if you discover fluids in your sump.
- If you see a fuel leak, turn off the pump.
- Report the presence of fuel or water in a sump to the DEP within 24 hours.
- Maintain a log of weekly sump checks on site to document your leak detection activities.



An automatic tank gauge in alarm.



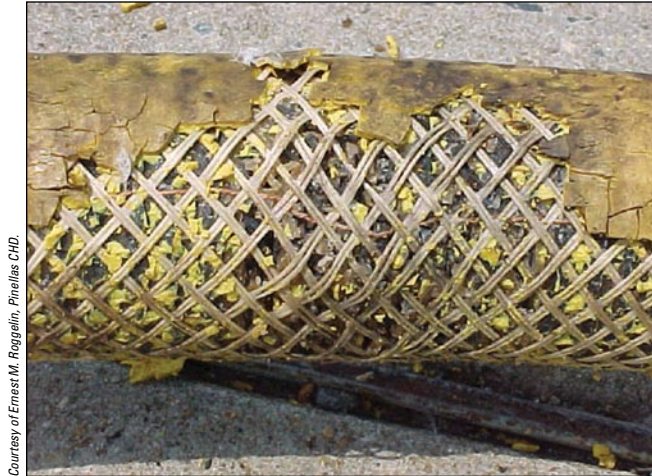
A leak sensor in alarm.



A tank-top sump with water in it. The presence of water or fuel in a sump must be reported to the DEP within 24 hours of discovery. A qualified service technician should be called to diagnose the problem and properly dispose of whatever liquids are removed from sumps.

WHAT YOU SHOULD KNOW ABOUT FLEXIBLE PIPING

Some double-walled flexible piping sold in the 1990s has been found to severely deteriorate over time. Your certified installer/inspector will evaluate the condition of your piping during your annual inspection. If your piping is deteriorating, it will need to be repaired or replaced.



Courtesy of Ernest M. Roggelein, Pirellas CHD.

This flexible piping was bright yellow when it was installed, and the braiding that is visible was completely encased by the outer cover. Piping in this condition is severely degraded and may fail catastrophically at any time.



Courtesy of Ernest M. Roggelein, Pirellas CHD.

This flexible piping has "grown" in length, creating kinks in the pipe that can lead to a leak.

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