

OVERFILL PREVENTION: DROP-TUBE SHUTOFF VALVES

What is a fuel-delivery overfill? In a typical delivery, the tank on the truck is empty before the underground tank is completely full. If the underground tank is completely filled before the tank on the truck is empty, the driver will be stuck with a hose full of fuel. When your UST is full of fuel and the driver's hose is full of fuel that won't fit in the UST, the driver has an overfill situation.

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Courtesy of Marcell Moreau Associates, Portland, Maine.

Fuel Delivery. The driver is preparing to make a fuel delivery. The yellow hose will carry vapors from the underground tank back into the truck. The red hose will carry fuel from the truck into the underground tank. The "elbow" fitting the driver is handling creates a liquid-tight seal with the tank fill pipe. The right end of the red hose will be connected to the valve fittings under the truck. Each valve connects to a separate fuel-carrying compartment in the tank truck. The valves have covers over them to prevent drips and keep the valve mechanism clean.

What can the driver do? He has two options: wait for customers to buy enough fuel so the fuel in the hose will fit in the tank, or disconnect the hose and drain its contents into the spill bucket at the fill-pipe manhole, the most expedient option. However, if the spill bucket is not big enough to contain the remaining fuel, or if it is already full of water and/or dirt, then the fuel will spill into the environment, with the potential for soil and water contamination, not to mention a fire.

Fire codes say that delivery drivers should be standing right by their vehicles so they can pay attention to the delivery—not sitting inside the truck or inside a building. But, guess what? UST rules say that it is **YOUR** job to ensure a representative of the owner, operator, or oil transporter is physically present during fuel deliveries and monitoring all product deliveries or transfers in order to prevent overfills.

WHAT IS YOUR JOB IN PREVENTING DELIVERY OVERFILLS?

As the person who is legally responsible for ensuring that overfills do not happen during fuel deliveries at your UST facility, it is useful to have a written delivery procedure that you follow faithfully. This procedure should include the following measures:

- **Ensure there is enough room in the tank BEFORE each delivery.** Measure the fuel level in your tank(s) BEFORE each delivery. Know the “working” capacity of your tank(s). (The working capacity is the amount of fuel the tank will hold without triggering the overfill-prevention device.) If you have a tank gauge, order your fuel based on the 90% ullage reading from the tank gauge.
- **Monitor all fuel deliveries from beginning to end.** Delivery drivers tend to be a little more careful if someone is watching. If you have security cameras, focus one on your fuel-delivery area and let drivers know that they are on camera.
- **Inspect your spill buckets routinely.** If necessary, clean before and after each product delivery (see the *TankSmart* Spill Buckets module).
- **Report, and clean up all spills.** Have spill cleanup materials handy for small spills, and for bigger spills, post emergency phone numbers in a prominent location so you can report the spill to the appropriate authorities.

WHAT DO OVERFILL-PREVENTION DEVICES DO?

Overfill prevention devices are essentially your **BACKUP** if you fail to order the right amount of fuel. Remember, you are the primary overfill-prevention device. The function of overfill-prevention devices is to stop or severely limit the flow of product into the tank **BEFORE** the tank is filled to the very top, so there is still room to fit the contents of the hose into the tank. There are three technologies for doing this:

- ▶ **Ball-float valves** (also known as float-vent valves)
- ▶ **Electronic alarms**
- ▶ **Drop-tube devices** (also known as automatic-shutoff or “flapper” valves)

This module addresses Drop-Tube Shutoff Valves.

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Fuel Delivery Terms

Pumped delivery Fuel is pumped under substantial pressure from the truck to the tank. Most often the fuel flows through a long hose (hundreds of feet) stored on a reel on the truck. You receive a delivery ticket printed by a meter on the truck that shows an exact number of gallons delivered.

Gravity delivery Fuel flows under the influence of gravity from the truck to the tank. Most often the fuel flows through a short hose (10 to 20 feet long) that is connected and disconnected to the truck and the tank for each delivery. You receive a bill of lading printed at a terminal or bulk-storage plant that shows the number of gallons loaded onto the truck.

Tight fill The delivery hose is fastened to the fill-pipe opening using a delivery fitting that clamps onto the fill-pipe opening with a liquid-tight connection (see photo on page 1). Gasoline deliveries should be made using tight-fill connections.

Loose fill Delivery is accomplished by inserting a short length of pipe into the tank-fill opening, much the same way as a fueling nozzle is inserted into an automobile fill pipe.



This type of fuel delivery truck most often makes pumped deliveries.



This type of fuel delivery truck most often makes gravity deliveries.

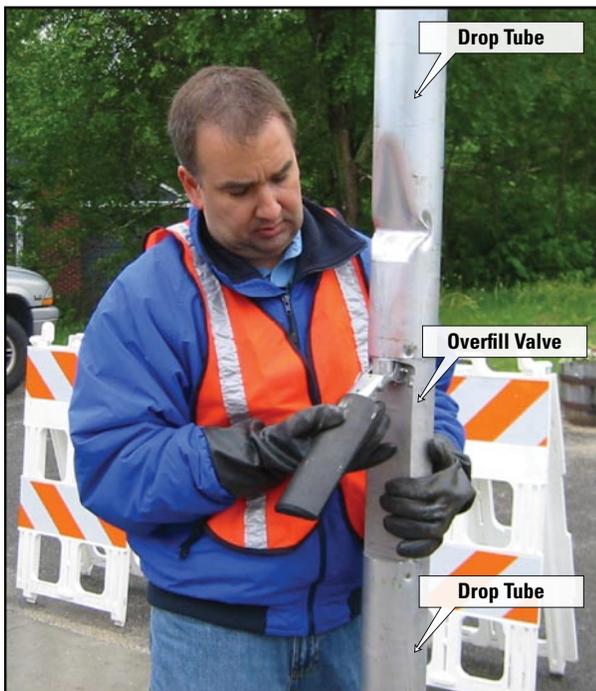
Courtesy of Marcel Moreau Associates, Portland Maine.

DROP-TUBE SHUTOFF VALVE (also called Automatic-Shutoff or "Flapper" Valve)

Drop-tube shutoff valves replace a section of the drop tube, a thin aluminum tube located inside the tank fill pipe and extending close to the bottom of the tank. Typically, there is a float-activated mechanism on the outside of the

tube that releases a valve, or flapper, inside the tube when the liquid level in the tank reaches 95% of full-tank volume. When this happens, the product flowing down the fill pipe slams the valve shut, severely restricting flow of fuel into the tank. The delivery hose "jumps," alerting the driver that the flapper has closed. At this point, the driver should stop the flow of fuel from the truck and drain any

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Courtesy of Marcel Moreau Associates, Portland Maine.

Drop-tube shut-off valves are installed as part of the drop tube that fits inside the tank fill pipe. These valves must be inspected annually for proper operation.

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fuel left in the hose into the tank. To notice the hose “jump,” the delivery driver must watch the delivery hose, not sit inside his truck or inside a building.

After the main valve closes, a bypass valve allows a small amount of product to flow (5- to 10-gallons per minute) and the hose to be drained. If the delivery is allowed to continue (10 minutes or so after the main valve closes), the bypass valve also closes and the delivery hose can no longer be drained into the tank until the tank’s liquid level is lowered.

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ISSUES WITH DROP-TUBE OVERFILL-PREVENTION DEVICES

Drop-tube shutoff valves work well as long as they are being used as intended and maintained properly. Be aware of the following potential problems associated with drop-tube devices:



Courtesy of Marcel Moreau Associates, Portland Maine.

Gauge sticks in fill pipes prevent drop-tube shutoff valves from operating. They are illegal and can result in overfills.

- **Drop-tube shutoff valves have moving parts that can break.** To ensure your drop-tube device is working properly, it must be tested annually during the annual inspection by a Maine-certified tank installer or inspector.
- **Drop-tube devices must not be disabled or bypassed.** A gauge stick in a fill pipe (see photo) prevents the drop-tube shutoff valve from closing and may mean that the valve is closing prematurely. If you find a gauge stick in your fill pipe, call a service technician to check out your overfill valve.
- **The sudden closing of the drop-tube valve puts a great deal of stress on the delivery system.** The hose connections to the tank and truck must be secure, or they may pop off, creating a significant surface spill.
- **There must be a tight-fill connection between the tank and the delivery hose.**
- **Deliveries must be made by gravity only.** If a delivery is made under pressure (pumped) and the device activates, something is likely to break.

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