

OVERFILL PREVENTION: BALL FLOATS

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 Marcel 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 them before and after each product delivery (see the *TankSmart* Spill Buckets module).
- **Respond to ALL overfill indications.** In the case of a ball float, there is no indication that the ball float has closed other than that the delivery is taking longer than normal. In order to perceive this, someone, be it the delivery driver or you, needs to be monitoring the delivery.
- **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.

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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 Ball-Float Valves.

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.

BALL-FLOAT VALVES (FLOAT-VENT VALVES)

Ball floats consist of a short length of pipe that extends down into the top of the tank from the vent opening. Typically, a wire cage containing a hollow ball is fastened to the lower end of the pipe. The ball sits below the end of the pipe within the wire cage. As long as the product level is below that of the ball, the tank vent pipe remains open and the tank can breathe. If the fuel level is too high, the ball floats up and blocks the vent opening. With the vent blocked, very little fuel can flow into the tank. For a ball float valve to work, the delivery hose must be tightly clamped to the fill pipe. Otherwise, fuel will back up the fill pipe and spill out of the fill opening.

The rules say these devices **must be set to operate at 90% of full-tank volume.**



Ball-float device.

Courtesy of Marcel Moreau Associates, Portland Maine.

WHEN SHOULD BALL-FLOAT DEVICES NOT BE USED?

Ball-float devices are not user friendly. They increase the pressure in the tank so that fuel can splash back on the driver if he tries to disconnect any hoses. Drivers often relieve the pressure in the tank by either opening the drain in the spill bucket or removing the cap on the ATG riser. This releases flammable vapors and creates a serious explosion hazard. There are so many

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potential problems with ball-float devices that the Petroleum Equipment Institute recommends that ball-float valves NOT be used at all. (See PEI/ RP100 *Recommended Practices for Installation of Underground Liquid Storage Systems*.) If you have ball-float overfill-prevention devices, be aware of the following situations that create extremely hazardous conditions:

DO NOT Use Ball-Float Devices...

- ▶ **On tanks that receive pressurized (pumped) deliveries.** The tank may become over pressurized, causing it to rupture. If the delivery is metered at the delivery truck, it is probably pressurized.
- ▶ **On tanks with remote fills and gauge openings.** Fuel may escape through the gauge opening if the tank is overfilled.
- ▶ **On tanks with suction pumps.** When the ball closes off the vent pipe, pressure builds in the tank and the fuel looks for an escape route—the pump. An overfill at the tank creates a fuel spill at the pump where your customers are. (See the *TankSmart* Piping: Suction Pumping Systems module.)
- ▶ **With loose fills.** If the delivery hose is not tightly clamped to the tank fill pipe, fuel will back up the fill pipe and spill onto the ground when the ball-float valve closes.
- ▶ **With coaxial Stage I vapor recovery.** In this situation the tank vents through the fill pipe, bypassing the regular vent. The ball-float valve is useless in preventing an overfill.
- ▶ **With generator or heating oil tanks.** These types of tanks very often have pumped deliveries and loose-fill connections, two things that are not compatible with ball-float valves.



A manway opening that blew open as a result of a pressurized delivery made to a tank equipped with a ball-float valve.

NOTE: Some tanks are equipped with both a ball-float valve and a drop-tube shutoff valve. Having both of these devices on the same tank is not necessarily better. Ball floats interfere with the operation of the drop-tube shutoff valve if the ball float operates first. If you feel you need two overfill devices, use a drop-tube shutoff valve in combination with an alarm, with the alarm set to operate at a lower level than the drop-tube device. Make sure you know what overfill device you have and at what level it is set to operate.

To ensure your overfill device is working properly, it must be tested annually during the annual inspection by a Maine-certified tank installer or inspector.