Defender Series™
Overfill Prevention Valve
Automatic Shutoff for USTs
Installation, Operation and Maintenance
708-590 Series

For use in 4" (102mm) gravity-fill applications only
25 - 370 GPM (94-1400 LPM) flow
Compatible with all motor fuel blends
Important Safety Messages

Franklin Fueling Systems (FFS) equipment is designed to be installed in association with volatile hydrocarbon liquids such as gasoline and diesel fuel. Installing or working on this equipment means working in an environment in which these highly flammable liquids may be present. Working in such a hazardous environment presents a risk of severe injury or death if these instructions and standard industry practices are not followed. Read and follow all instructions thoroughly before installing or working on this, or any other related, equipment.

As you read this guide, please be aware of the following symbols and their meanings.

**Warning**
This symbol identifies a warning. A warning sign will appear in the text of this document when a potentially hazardous situation may arise if the instructions that follow are not adhered to closely. A potentially hazardous situation may involve the possibility of severe bodily harm or even death.

**Caution**
This is a caution symbol. A caution sign will appear in the text of this document when a potentially hazardous environmental situation may arise if the instructions that follow are not adhered to closely. A potentially hazardous environmental situation may involve the leakage of fuel from equipment that could severely harm the environment.

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**Warning**
Follow all applicable codes governing the installation and servicing of this product and the entire system. Always lock out and tag electrical circuit breakers while installing or servicing this equipment and related equipment. A potentially lethal electrical shock hazard and the possibility of an explosion or fire from a spark can result if the electrical circuit breakers are accidentally turned on during installation or servicing. Please refer to the *Installation and Owner’s Manual* for this equipment and the appropriate documentation for any other related equipment for complete installation and safety information.

**Warning**
Before entering a containment sump, check for the presence of hydrocarbon vapors. If these vapors are inhaled they could cause dizziness or unconsciousness, and, if ignited, hydrocarbon vapors could explode causing serious injury or death. Electronic and electrical petroleum monitoring equipment is often housed in containment sumps designed to trap hazardous liquid spills and prevent contamination of the environment, and, as a consequence, containment sumps can trap dangerous amounts of hydrocarbon vapors. If these vapor levels reach unsafe amounts, ventilate the sump with fresh air. While working in the sump, periodically check the atmosphere in the sump, if vapors reach unsafe levels, exit the sump and ventilate it before continuing work. Always have a second person standing by for assistance when working in, or around, a containment sump.

**Warning**
Follow all federal, state, and local laws governing the installation of this product and its associated systems. When no other regulations apply, follow NFPA codes 30, 30A, and 70 from the National Fire Protection Association. Failure to follow these codes could result in severe injury, death, serious property damage, and/or environmental contamination.

**Warning**
Always secure the work area from moving vehicles. The equipment in this manual is usually mounted underground, so reduced visibility puts service personnel working on this equipment in danger from moving vehicles entering the work area. To help eliminate these unsafe conditions, secure the area by using a service truck to block access to the work environment, or by using any other reasonable means available to ensure the safety of service personnel.

**Caution**
Use only original FFS parts. Substituting FFS parts may cause failure of the device, which, in turn, may create a hazardous condition and/or damage the environment.
Introduction
FFS’s model 708-590 Series Overfill Prevention Valve should only be installed in a spill container through a 4” (102 mm) schedule 40 tank riser. The valve is designed with a primary shutoff that will activate between 85 and 92% of tank volume, depending upon tank size. After the primary shut-off is actuated the flow through the valve is limited to less than 8 gpm (30 lpm). A secondary, positive shutoff will occur at 95% tank volume if filling continues. After primary shutoff occurs, the delivery hose may still be drained by using extreme caution, and taking these steps:

- Close the truck bottom loading valve. Wait 5 minutes
- Crack open the coupler between the delivery hose and the bottom loading valve, to allow the hose to drain slowly.

Note: Shutoff points are influenced by the specific gravity of stored liquids. These instructions are based on average performance using all products. *This valve was designed to be used as an emergency overfill prevention device only!*

Caution
To prevent product spillage from an underground storage tank (UST), well-maintained delivery equipment, a proper connection, and a tight fill adaptor are essential. Delivery personnel should inspect delivery elbows and hoses for damage and missing parts.

Caution
The Overfill Protection Valve uses a strong magnet. Do not allow the Valve near a person with a pacemaker or similar medical aid. The strong magnetic field of the magnet can affect the operation of such medical devices.

Caution
Discharge to ground before putting into service and ensure valve is properly grounded while in service.

Caution
When inserting the drop tube / Valve assembly into the tank riser pipe, use caution not to forcefully impact the tank riser pipe.

Caution
When raising / lowering the drop tube / valve assembly while inside the tank riser pipe, do so in a slow, controlled manner.

Caution
It is the responsibility of the end user of this product to evaluate each installation location for the following potential ignition sources: Radio waves, ionizing radiation and ultrasound sound waves. If any of these potential ignition sources are identified, protective systems / measures shall be implemented.

Tools Needed for Installation and Assembly
- Tape Measure
- Half Round File
- Permanent Marker
- * FFS Pipe Cutter
- * Groove Roller Tool

Packing List
- (1) Valve Assembly
- (1) Installation Manual
- (1) Gasket – Upper Drop Tube (4”)
- (1) Hose Clamp
- (1) Warning Plate

* Refer to the Product Catalog for ordering information.
Determining Drop Tube Lengths

Figure 1: Installation Overview and Drop Tube Calculation

- **Upper Drop Tube Length “X”**
  - \[ X = \text{Top of riser to bottom of tank} - \text{Position and mounting adjustment} \]
  - \[ X = \text{Top of riser to bottom of tank} - 2\frac{1}{2}\text{” (63.5 mm)} \]
  - \[ X = \text{Top of riser to bottom of tank} - \text{OPV Length Offset} \]

- **Lower Drop Tube Length “Y”**
  - \[ Y = \text{95% Volume height} - \text{Tank bottom clearance} \]
  - \[ Y = \text{95% Volume height} - 2\frac{1}{2}\text{” (63.5 mm)} \]
  - \[ Y = \text{95% Volume height} - \text{OPV Length Offset} \]

*If local codes require this distance to be smaller, subtract less than 6” (152mm)*

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To find 95% Tank Volume and Measurement From Tank Chart

- **Actual Tank Capacity**
  - Gallons

- **X**
  - Gallons (95% Tank Volume)

- **95% Volume Height**
  - \[ \text{Gallons} \times 0.95 = B \]
**Explanation of Figure 1 Dimensions**

<table>
<thead>
<tr>
<th>A</th>
<th>Distance from the seat surface of the upper drop tube to the bottom of the underground storage tank. The seat surface will vary depending on the type of installation (see Figure 2).</th>
</tr>
</thead>
</table>
| B | 95% tank volume – obtained from the tank chart provided by the tank manufacturer. To find the 95% tank level on the tank chart, multiply the actual tank capacity by .95. Then find on the tank chart the level measurement that matches the calculated volume the closest.  
Note: If local codes allow the positive shutoff level to be different from 95%, the installing contractor may adjust the “B” dimension per the tank chart to achieve the desired level.  
Note: If tank tilt is an issue, the installing contractor may use best judgment to adjust “B” dimension accordingly, so “… none of the fittings located on top of the tank are exposed to product due to overfilling,” per EPA 40CFR280 |

**MARKING & CUTTING THE TUBES**

1. Mark the upper drop tube with the length “X” calculated from Figure 1, measuring per Figure 3:
   - Upper Drop Tubes
     - Dual Point Measure from flange
     - Poppeted Coaxial (EBW) Measure from retaining ring
     - Non-Poppeted Coaxial (EBW) Measure from bottom of lug

2. Mark the lower drop tube with the length “Y” calculated from Figure 1:
   - Lower Drop Tube
     - Cut straight
     - Option: cut approx. 45°
3. Cut the upper drop tube where marked, using the Franklin Fueling Systems pipe cutter.
   a. If using the Franklin Fueling Systems Pipe Cutter, tighten the handle in very small increments (<1/10 turn per every 2 rotations of the tool).
      To get the cut started and keep the cutter from “walking”, tighten the blade against the tube just enough to make contact. Then rotate one full turn in one direction.
      Next, rotate one full turn in the opposite direction. Tighten the cutter approximately 1/10th of a turn and repeat until a good scribe line is created.
      Overtightening the cutter wheel will result in crimping of the aluminum tube, which will cause the end to be too small for the adapter to fit inside.
   b. If using a metal cutting saw blade, make sure to cut as squarely as possible. Using the band clamp supplied with the warning tag as a guide will aid in cutting squarely.

4. Using the half-round file, deburr the inside of the tube. Check to see if the upper tube adapter fits inside the upper drop tube – if not, more deburring may be needed.

5. Cut the lower drop tube as marked, using the FFS pipe cutter or a saw with a metal cutting blade.
   a. If cutting the lower drop tube at a 45 degree angle, make sure the lowest point of the drop tube does not project within the minimum clearance specified by the tank manufacturer (or per local requirements).

Installing the Upper Tube Adapter
1. Replace the cutting wheel on the Franklin Fueling Systems Pipe Cutter with the Roller Tool (Figure 5).
2. From the cut end of the upper drop tube, mark the grooves on the tube (Figure 6).
3. Install the drop tube gasket onto the upper drop tube (Dual Point Installation, Figure 7).
4. Check to make sure the O-rings are installed on the upper tube adapter.
5. Insert the upper tube adapter into the cut end of the upper drop tube.
6. Position the Roller Tool over the mark and lightly tighten.
7. To get the cut started and keep the roller from “walking”, tighten the roller against the tube just enough to make contact. Then rotate one full turn in one direction and then rotate one full turn in the opposite direction. Tighten the roller approximately 1/10th of a turn and repeat until the groove is complete.
The tube is indented enough when the shoulder of the roller tool contacts the tube and creates a witness line/mark.

**Completing the Installation**

Before you begin assembly, clear the inside diameter of the tank riser pipe of any burrs, improper reaming, or foreign material. Failure to adequately clean the inside of the tank riser pipe may damage or prevent the valve from functioning properly.

**Note:** The upper and lower threads of the valve come pre-lubricated from the factory. DO NOT USE PIPE SEALANT. Verify the O-rings are present and not damaged.

1. Thread the upper and lower drop tubes onto the Overfill Prevention Valve and tighten using strap wrenches (DO NOT USE PIPE WRENCHES). Position one on the upper drop tube, and the other on the lower drop tube (see Figure 11). DO NOT TIGHTEN ON THE FLOAT SHIELD OR VALVE.

2. Check the float and flapper mechanism by rotating the outer coupler (counter-clockwise). This should activate the internal flapper and operate smoothly. (Figure 10)

3. Double-check to see that the drop tube gasket was installed under the upper drop tube flange (dual point installation, Figure 7).

4. Before inserting drop tube into the riser pipe, dissipate any static buildup by grounding to earth.

5. Carefully lower the completed assembly down the riser pipe (DO NOT DROP). Do not force the valve down the riser pipe. If the valve does not fit, the riser pipe may have to be cleaned or deburred further.

![Figure 8: First Indent](image1)

8. Repeat steps 6 & 7 for the second mark

![Figure 9: Second Indent](image2)

![Figure 10: Outer Coupler, Lowered and Raised](image3)

![Figure 11: Do Not Tighten on the Float Shield](image4)
5. Reinstall the spill bucket components.
6. Install the warning plate around the 4" (102 mm) riser pipe below the threaded portion using the stainless steel band clamp (see Figure 12).

![Figure 12: Install Warning Plate](image)

7. Perform Operational Inspection Procedure.

**Operational Inspection Procedure**
The valve can easily be inspected by use of the Franklin Fueling Systems remote test tool.

![Figure 13: Inspection Tool](image)

**Procedure**
1. Assemble the remote test tool with enough extension sections to reach the Overfill Prevention Valve.
2. Insert the remote test tool into the drop tube. You should feel a “pull” when the magnets are positioned correctly and attract.
3. Slowly raise the remote test tool about 1 ½" (38mm) and you should see the flapper move into the flow path.

![Figure 14: Valve Inspection, Flapper In](image)

4. If the flapper is observed moving back and forth, the valve is functioning normally.

**Note:** If required by local agency, a non-sparking stick/rod no larger than .750" (19 mm) dia may be inserted through the remote test tool opening to push flapper to the fully closed position.

5. To remove the remote test tool, simply pull out of the drop tube. The magnets will disengage and the flapper should reset automatically.

![Figure 15: Valve Inspection, Flapper Out](image)
Maintenance
The 708-590 Series Overfill Prevention Valve has no periodic maintenance requirements.

However, if the drop tube and valve assembly is removed from the tank (for inspection or service), inspect the drop tube seal for wear/damage (Figure 16). Replace if necessary.

Additionally, if the upper or lower drop tube is unthreaded/removed from the OPV, the O-ring(s) should be replaced (Figure 17).

Inspecting/Verifying 95% Level (Without Removing from Tank)
FOR DIMENSIONS “A” & “B”: Refer to the “installation record sheet” or re-measure and re-calculate per figure 1.

1. Measure Dimension “Z” (Figure 18)
   
   “Z” (Upper drop tube flange to edge of upper tube adapter)

2. Verify using the calculation below
   
   “A” (Drop tube seal surface to bottom of tank)
   - (Subtract)
   “B” (95% Volume from tank chart)
   - (Subtract)
   4.5" (114 mm) (95% Shutoff level offset)
   = (Equals)
   
   Same value as “Z” indicates correct installation
Certification Information

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Product Specifications

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<th>Construction</th>
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<tbody>
<tr>
<td>Valve Body</td>
<td>E-Coated Cast Aluminum</td>
</tr>
<tr>
<td>Upper Drop Tube</td>
<td>Aluminum or Hard Coat Anodized Aluminum</td>
</tr>
<tr>
<td>Lower Drop Tube</td>
<td>Aluminum or Hard Coat Anodized Aluminum</td>
</tr>
<tr>
<td>Internal Mechanism</td>
<td>Nickel plated Aluminum, Stainless Steel, Acetal</td>
</tr>
</tbody>
</table>
# Overfill Prevention Valve Installation Record Sheet

**Date Installed**: 
____________________

**Valve Serial Number**: 5 0 __ __ __ __ __ __

## Site Information

- **Site # / Description**: ____________________________________________________________
- **Site Address**: ________________________________________________________________
- **Site Contact**: ________________________________________________________________

## Installing Contractor

- **Name**: ________________________________________________________________
- **Company**: ________________________________________________________________

## Tank Information

- **Product Type**: ________________________________________________________________
- **Underground Tank Manufacturer**: ______________________________________________
- **Tank Full Volume**: __________________________________________________________
- **Tank Diameter**: _____________________________________________________________
- **Tank Chart Available?**: □ Yes □ No
- **Tank Type**: □ Steel □ Fiberglass □ Square □ Cylinder □ Dome Ends
- **Tank have compartments?**: □ Yes □ No

## Tank/Drop Tube Measurements

- **Upper Drop Tube Length (X)**: _________________________________________________
- **Lower Drop Tube Length (Y)**: _________________________________________________
- **Distance from Lower Drop tube to tank bottom**: ________________________________

## Dimensions

- **A**: ______________________________
- **B**: ______________________________

## Operational Inspection Procedure Performed

- □ Yes
- □ No

**Initials** | **Date**
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Franklin Fueling Systems • 3760 Marsh Rd. • Madison, WI 53718 USA
Tel: +1 608 838 8786 • 800 225 9787 • Fax: +1 608 838 6433 • www.franklinfuelling.com