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

For use in 4” gravity-fill applications only
25-370 Gallons per Minute 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.

**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.
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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. 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.

Tools Needed for Installation and Assembly

<table>
<thead>
<tr>
<th>Tool/Part</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tape Measure</td>
</tr>
<tr>
<td>Half Round File</td>
</tr>
<tr>
<td>Permanent Marker</td>
</tr>
<tr>
<td>* FFS Pipe Cutter</td>
</tr>
<tr>
<td>* Groove Roller Tool</td>
</tr>
</tbody>
</table>

Packing List

<table>
<thead>
<tr>
<th>Item</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Valve Assembly</td>
</tr>
<tr>
<td>(1) Installation Manual</td>
</tr>
<tr>
<td>(1) Gasket – Upper Drop Tube (4&quot;)</td>
</tr>
<tr>
<td>(1) Hose Clamp</td>
</tr>
<tr>
<td>(1) Warning Plate</td>
</tr>
</tbody>
</table>

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

**Figure 1: Installation Overview and Drop Tube Calculation**

Defender Spill Containment (Ref.)

**Defender Spill Containment (Ref.)**

- **A**
  - Distance from the seat surface of the upper drop tube to the inside of the top of the tank. The seat surface will vary depending on the type of installation (see Figure 2).
  - If this is a manway application, be sure to include the height of the manway to the inside of the top of the tank.

- **B**
  - 95% tank volume offset – obtained from the tank chart provided by the tank manufacturer. This is typically equal to the 5% level measurement. To find the 5% tank level on the tank chart, multiply the full tank capacity by .05. Then find on the tank chart the level measurement that matches the calculated volume the closest. If this is a manway application, be sure to include the height of the manway to the inside of the top of the tank.
  - 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

- **C**
  - Distance from the seat surface of the upper drop tube to the bottom of the tank.

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**To find Upper Drop Tube length “X”**

- “A” ▶️ Riser Length
  + (add)
- “B” ▶️ 95% Offset
  - (subtract)
  - 2½” ▶️ Position and mounting adjustment
  = (equals)
- “X” ▶️ Upper Drop Tube Length

**To find Lower Drop Tube length “Y”**

- “C” ▶️ Riser to tank bottom
  - (subtract)
- “X” ▶️ Upper Drop Tube Length
  - (subtract)
  - 18¼” ▶️ OPV Length
  - (subtract)
  - 6” ▶️ Tank bottom clearance
  = (equals)
- “Y” ▶️ Lower Drop Tube Length

**To find Tank Volume Offset**

- Tank Capacity
  
  X
  
  .05
  =
  
  5% Volume
  (Correlate this number with the tank chart)

  5% Height
  ▶️ = B
Figure 2: Installation Dimensions per Spill Container

If the tank chart is not available, the following tables may be used FOR REFERENCE ONLY. The actual “B” dimension will vary based on the actual tank diameter end type.

### Round Tank with Dome Ends

<table>
<thead>
<tr>
<th>Tank Diameter</th>
<th>Appx. Dim. “B” for 95% Shutoff</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 feet (122 cm)</td>
<td>5” (127 mm)</td>
</tr>
<tr>
<td>5 feet (152 cm)</td>
<td>6¾” (159 mm)</td>
</tr>
<tr>
<td>6 feet (183 cm)</td>
<td>7½” (191 mm)</td>
</tr>
<tr>
<td>7 feet (213 cm)</td>
<td>8¼” (222 mm)</td>
</tr>
<tr>
<td>8 feet (244 cm)</td>
<td>10” (254 mm)</td>
</tr>
<tr>
<td>9 feet (274 cm)</td>
<td>11¼” (286 mm)</td>
</tr>
<tr>
<td>10 feet (305 cm)</td>
<td>12½” (318 mm)</td>
</tr>
<tr>
<td>12 feet (366 cm)</td>
<td>15¼” (387 mm)</td>
</tr>
</tbody>
</table>

### Round Tank with Square Ends

<table>
<thead>
<tr>
<th>Tank Diameter</th>
<th>Appx. Dim. “B” for 95% Shutoff</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 feet (122 cm)</td>
<td>5” (127 mm)</td>
</tr>
<tr>
<td>5 feet (152 cm)</td>
<td>6” (152 mm)</td>
</tr>
<tr>
<td>6 feet (183 cm)</td>
<td>7½” (191 mm)</td>
</tr>
<tr>
<td>7 feet (213 cm)</td>
<td>8” (203 mm)</td>
</tr>
<tr>
<td>8 feet (244 cm)</td>
<td>9 ¼” (241 mm)</td>
</tr>
<tr>
<td>9 feet (274 cm)</td>
<td>10½” (267 mm)</td>
</tr>
<tr>
<td>10 feet (305 cm)</td>
<td>13” (330 mm)</td>
</tr>
<tr>
<td>12 feet (366 cm)</td>
<td>14” (356 mm)</td>
</tr>
</tbody>
</table>

### Square Tank

<table>
<thead>
<tr>
<th>Tank Diameter</th>
<th>Appx. Dim. “B” for 95% Shutoff</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 feet (122 cm)</td>
<td>2½” (64 mm)</td>
</tr>
<tr>
<td>5 feet (152 cm)</td>
<td>3” (76 mm)</td>
</tr>
<tr>
<td>6 feet (183 cm)</td>
<td>3½” (89 mm)</td>
</tr>
<tr>
<td>7 feet (213 cm)</td>
<td>4¼” (108 mm)</td>
</tr>
<tr>
<td>8 feet (244 cm)</td>
<td>5” (127 mm)</td>
</tr>
<tr>
<td>9 feet (274 cm)</td>
<td>5¼” (140 mm)</td>
</tr>
<tr>
<td>10 feet (305 cm)</td>
<td>6” (152 mm)</td>
</tr>
<tr>
<td>12 feet (366 cm)</td>
<td>7½” (184 mm)</td>
</tr>
</tbody>
</table>

**MARKING & CUTTING THE TUBES**

1. Mark the upper drop tube with the length “X” calculated from Figure 1, measuring per Figure 3:

   - 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.
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 deg 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.

Figure 5: Pipe Cutter and Roller Tool
Figure 6: Mark the Drop Tube
Figure 7: Drop Tube Gasket Installed (note orientation)
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.

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.

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**Figure 8: First Indent**

8. Repeat steps 6 & 7 for the second mark.

**Figure 9: Second Indent**

**Figure 10: Outer Coupler, Lowered and Raised**

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

**Figure 11: Do Not Tighten on the Float Shield**
5. 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

6. Reinstall the spill bucket components. The valve is now installed and ready for inspection.

Maintenance
The 708-590 Series Overfill Prevention Valve is maintenance free. Franklin Fueling Systems recommends, however, that a visual inspection be performed upon installation and annually thereafter.

Overfill Prevention Valve Inspection
The valve can easily be inspected by use of the Franklin Fueling Systems inspection tool.

Procedure
1. Assemble the remote tool with enough extension sections to reach the Overfill Protection 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 inspection tool about 1 ½" and you should see the flapper move into the flow path.
4. If the flapper is observed moving back and forth, the valve is functioning normally.
Inspecting/Verifying
95% level from grade (without removing from tank)
1. Measure from the top of the drop tube flange to the top edge of the tube adapter (Figure 16).
2. Add 4½" to the measured value.
3. This number should match A plus B (from Figure 1).

Figure 16: Dimension Verification After Installation
Dimension Drawing

Product Specifications

<table>
<thead>
<tr>
<th>Construction</th>
<th>Specifications</th>
</tr>
</thead>
<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>
Date Installed

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 ________________________________

Length
A_____________________
B_____________________
C_____________________