Franklin Electric
FUELING SYSTEMS

DEFENDER SERIES®
OVERFILL PREVENTION VALVE

INSTALL GUIDE

F-9044 r12

DEFENDER®
SERIES OPV

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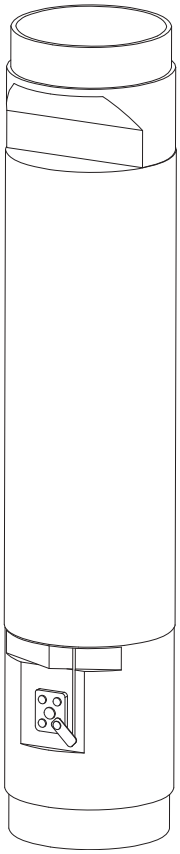

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F-9044 r12

CONVENTIONS USED IN THIS DOCUMENT

This document includes safety precautions and other important information presented in the following format:

NOTE: This provides helpful supplementary information.

IMPORTANT: This provides important supplementary information and instructions to avoid damaging hardware or a potential hazard.

⚠ **CAUTION**: This indicates a potentially hazardous situation that could result in minor or moderate injury if not avoided. This may also be used to alert against unsafe practices.

⚠ **WARNING**: This indicates a potentially hazardous situation that could result in severe injury or death if not avoided.

⚠ **DANGER**: This indicates an imminently hazardous situation that will result in death if not avoided.

OPERATING PRECAUTIONS

Franklin Electric equipment is designed to be installed in areas where volatile liquids such as gasoline and diesel fuel are present. Working in such a hazardous environment presents a risk of severe injury or death if you do not follow standard industry practices and the instructions in this document. Before working with or installing the equipment covered in this document, or any related equipment, read this entire document, particularly the following precautions:

IMPORTANT: To help prevent spillage from an underground storage tank, make sure the delivery equipment is well-maintained, that there is a proper connection, and that the fill adaptor is tight. Delivery personnel should inspect delivery elbows and hoses for damage and missing parts.

⚠ **CAUTION**: Use only original Franklin Electric parts. Substituting non-Franklin Electric parts could cause the device to fail, which could create a hazardous condition and/or harm the environment.

⚠ **WARNING**: Follow all codes that govern the installation and service 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 while installing or servicing this product. Refer to this document (and documentation for related equipment) for complete installation and safety information.

⚠ **WARNING**: Before entering a containment sump, check for the presence of hydrocarbon vapors. Inhaling these vapors may cause dizziness/unconsciousness, and if ignited, can explode causing serious injury or death. Containment sumps are designed to trap hazardous liquid spills and prevent environmental contamination, so they can accumulate dangerous amounts of hydrocarbon vapors. Check the atmosphere in the sump regularly while work is in process. If vapors reach unsafe levels, exit the sump and ventilate it with fresh air before resuming work. Always have another person standing by for assistance.

⚠ **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 document is usually mounted underground, so reduced visibility puts service personnel working on it in danger from moving vehicles that enter the work area. To help prevent this safety hazard, secure the area by using a service truck or other vehicle to block access to the work area.

⚠ **DANGER**: Inspect the installation location for potential ignition sources such as flames, sparks, radio waves, ionizing radiation, and ultrasound sonic waves. If any potential ignition sources are identified, implement proper safety measures.

Contents

1 Introduction

The DEFENDER SERIES® Overfill Prevention Valve (OPV) prevents the overfill of an underground storage tank during gravity-fed product delivery. The OPV employs a revolutionary magnetically-coupled actuator system to provide positive shutoff. *This unique method of shutoff eliminates any penetrations in the valve, making it both vapor and leak tight.* ***Additionally, the OPV's innovative design also allows for remote compliance testing of the primary functionality at grade level without having to remove the OPV from the tank.***

1.1 Regulatory Compliance

IMPORTANT INFORMATION - FOLLOW ALL INSTRUCTIONS

- This document contains the procedure and related information for installing a DEFENDER SERIES® OPV. The content herein is intended for personnel who are qualified (certified) in the installation of the OPV (see §2.5). *Use of non-qualified personnel, or any deviations from these recommended procedures, could result in damage or malfunction.*
- For Storage & Transit Information, see §3.1.1.
- For Operating Parameters, see §3.2.2.
- For Specific Conditions of Use, see §3.2.2.1
- For Maintenance & Inspection, see §5.
- For Certifications & Approvals, see §6.2.

1.2 General Guide Usage

- Instructions of this document are in English. All other language versions are translations of this original document.
- Information given in this document is provided as a guide only.
  - The Illustrations depict a typical setup and are for instruction and description purposes only.
  - It is the installer's responsibility to ensure that correct and safe procedures are followed at the worksite.
- This document and related documents are available from Franklin Electric at www.franklinfueling.com.

1.2.1 Symbol Legend

 Wear Protective Headwear

 Wear Eye Protection

 Wear Protective Clothing

 Wear High-Visibility Clothing

 Wear Protective Gloves

 Wear Safety Footwear

 Refer to instruction guide

 Ventilate Before & During Entering

 Ensure Continuous Ventilation

 Connect an earth terminal to the ground

 Lockout/Tagout Electrical Equipment

 Disconnect main plug from electrical outlet

 Disconnect before carrying out maintenance or repair

 General Warning

 Warning: Flammable Material

 Warning: Electricity

 No open flame; Fire, open ignition source and smoking prohibited

2 Safety/Security

2.1 General Safety Information

- Procedures in this document are only to be performed by people qualified and certified to perform them (see §2.5).
- Personnel working on or with energized equipment must be authorized by relevant regulatory bodies to carry out such work and must have the appropriate training. Check with your employer and relevant regulatory body's rules for working with energized equipment.
- Obey all local laws, rules, regulations, and instructions in this document. In case of inconsistency or contradiction between information contained in this document and any laws, rules and regulations, obey the stricter of the two.
- Keep unqualified personnel at a safe distance during installation.
- If it is necessary to remove safety/security devices, immediately reinstall the safety/security devices after completing the work.

2.2 Documentation Availability

- Site Owner/Operator – Save this guide for future use, and make sure to provide it to anyone who services this equipment.
- Always reference the guide(s) that came with the equipment for a complete list of installation and safety precautions. The most current Franklin Electric documentation can be found online at www.franklinfueling.com.

2.3 Hazard Assessment

Prior to beginning work and prior to recommencing work after leaving and returning to the worksite, a worksite, *pre-job hazard assessment* must be performed to identify safety and environmental needs. At a minimum, this hazard assessment should:

- Identify possible hazards and risks.
- Identify the safety needs of the job.
- Identify the correct procedures, practices and equipment.
- Eliminate unsafe conditions and actions from the worksite.
- Identify the need for personal protective equipment.
- Inspect equipment before use.
- Confirm sheaths of all cables are secured and undamaged.
- Confirm plugs and connectors are properly connected and serviceable.
- Perform ongoing risk assessment during the project.

2.4 Required Personal Protective Equipment (PPEs)

These PPEs are required during all phases of installation.


Wear Protective Clothing


Wear Eye Protection


Wear High-Visibility Clothing


Wear Protective Gloves


Wear Protective Headwear


Wear Safety Footwear

2.5 Qualifications & Responsibilities

2.5.1 Qualifications For FE Overfill Prevention Certification

To be considered "qualified", individuals shall pass training from the following certification training course (online or live):

- Fuel System Installation Safety
- Overfill Prevention (Forecourt Specialist Track)

FE Online or Live Certification Training

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2.5.2 Responsibilities

The following responsibilities are for guidance only and are not limited to those listed here.

It is the responsibility of:

- The owner of the install site(s) to ensure that all OPV installers shall be certified (see §2.5.1), follow all local laws, rules and regulations, along with the instructions and the specifications listed in this document.
- The certified user(s) to know the OPV sensor and its safe use.
- The certified user(s) to have and maintain a valid Franklin Electric training certification (see §2.5.1).

3 Pre-Installation Overview

3.1 Upon Receipt Of Item(s)

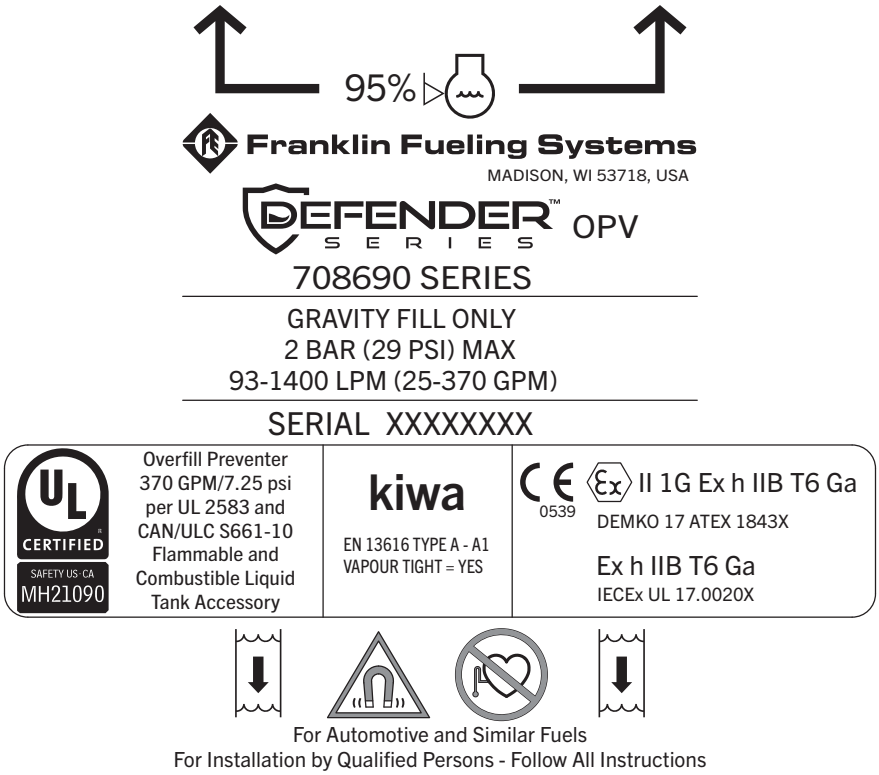
- Verify all items are in accordance with the order *(see § 3.1.2).*
- Check all items for damage.
- If any item shows damage or is not in accordance with the order, inform Franklin Electric *immediately*.
- Remove the packaging material.
    - Follow all local laws, rules and regulations regarding disposal of discarded parts, packaging material or items and any subsequent components.

3.1.1 Storage and Transit Information

Tank accessories are not intended for extended storage in excessive temperatures. Rough handling (drops, impacts, crushing, dragging, etc.) during transit may cause damage or malfunction during use.

3.1.2 OPV Identification Verification

IMPORTANT Confirm that the etching on the valve to be installed matches the etching shown here. *If the etching on the valve to be installed does not match this example,* ***do not install.*** *Contact Franklin Electric Technical Support.*



3.2 Technical Overview

3.2.1 Valve Operation

The Franklin Electric (FE) DEFENDER SERIES® Overfill Prevention Valve (OPV) is designed with a primary shutoff that activates between 85% and 92% of tank volume, depending on the tank diameter. When the primary shutoff is actuated, the flow through the OPV is restricted to less than 8 gpm (30 lpm). A secondary, positive shutoff occurs at 95% tank volume if filling continues. After primary shutoff, the delivery hose may still be drained, but extreme care must be used, and the following steps must be taken:

1. Close the truck bottom loading valve.
2. Wait five minutes.
3. Partially open the coupler between the delivery hose and the bottom loading valve and allow the hose to drain.

NOTE:

- Shutoff points are affected by the specific gravity of the stored liquids. These instructions are based on the average performance of all products. *The OPV was designed to be only an emergency overfill prevention device.*
- Determine if the underground storage tank has a ball float vent valve. *If it does, make sure the nipple portion does not extend more than 3" (76.2 mm) into the tank.*

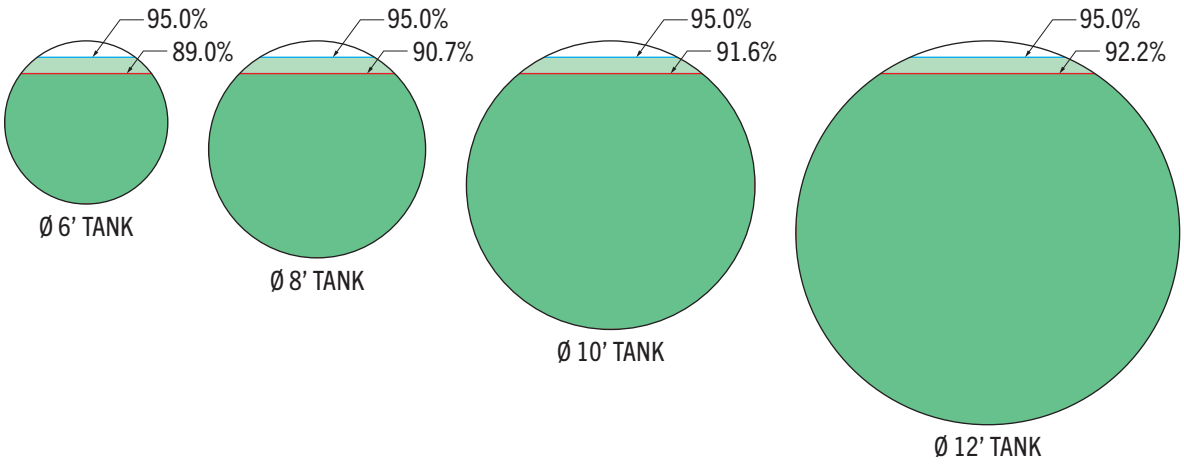
3.2.1.1 Tank Size & Installation Of Overfill Prevention Devices

In a two-stage, mechanical Overfill Prevention Valve (OPV), primary closure of the device significantly restricts the flow of fuel into the tank. *After primary shutoff occurs, the delivery hose can be drained slowly 3–5 gpm (11–18 lpm) until secondary or "positive" shutoff occurs.* ***Under current EPA regulations and industry standards, secondary shutoff is typically set at 95% of tank volume; however, other local regulations may prescribe other values.***

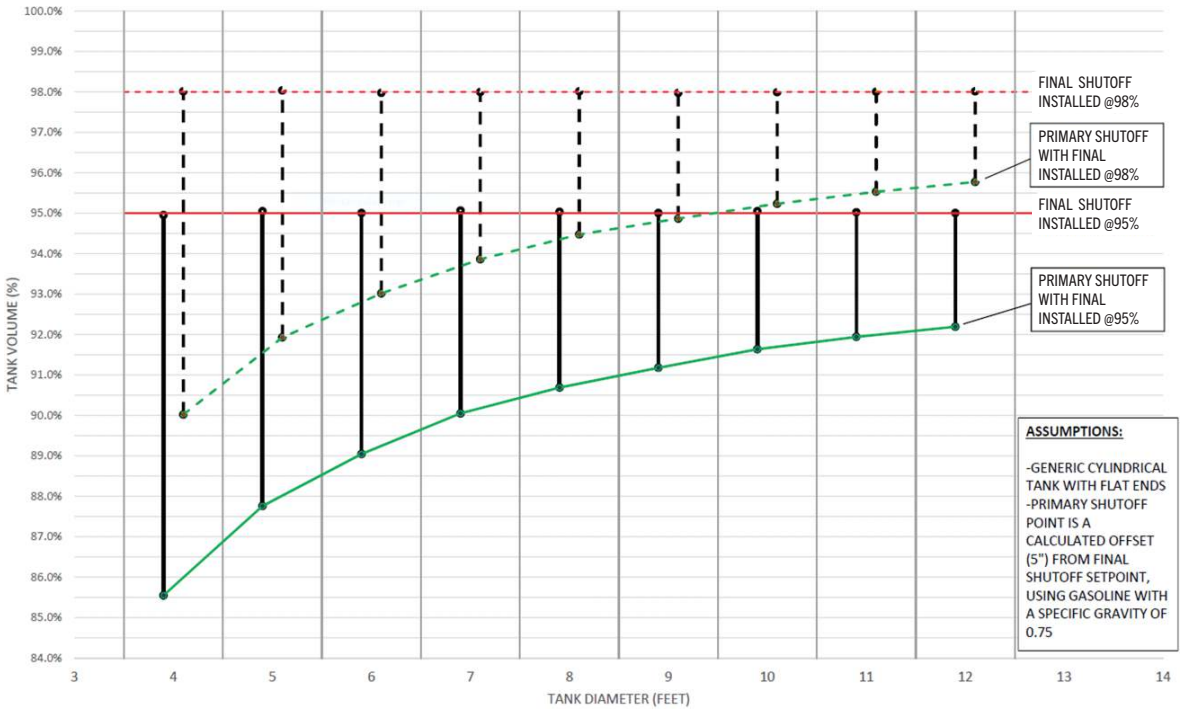
Mechanical OPVs use a float(s) to trigger shutoff, or closure, of the device and restrict flow to the storage tank. The shutoff level of the secondary ("positive") closure can be set based on the height of installation in the tank. The height of this installation typically is correlated with a volume percentage such as 95%. The level of the primary shutoff point will fluctuate to some degree based variables such as the:

- Size and shape of the tank (see the next page for illustrations).
- Specific gravity of the stored liquid.
  The offset picture is based on a specific gravity of 0.75 for gasoline and 0.85 for diesel. *A lower specific gravity will need more fluid to create equivalent buoyancy, which equates to a higher shutoff level (and vice-versa).*
- Flow rate during delivery.
  The offset is based off data from our production flow test apparatus, which runs at 370 gpm. *A lower flow rate causes less buoyancy force needed to activate the primary, which equates to a lower shutoff level.*

NOTE: The most influential of these variables is the size and shape of the tank volume (see next page). *Always use a calibrated tank chart in combination with the manufacturer's instructions for best results.*



NOTE: When the secondary, or "positive," shutoff is set at 95% of the tank volume, the level at which the primary shutoff occurs varies depending on the total tank volume. The illustration above demonstrates how tank volume can influence the actual shutoff levels of a mechanical OPV.



NOTE: The installation height of an OPV can be adjusted to optimize actual shutoff levels as required. *Consult local regulations for specific requirements in your area.* The above graph shows how a two-stage, mechanical overfill prevention device is influenced by tank diameter and volume.

3.2.2 Specifications

Item	Specification
Model	708690 Series
Type	Class I Automatic Overfill Shutoff Device–Gravity Fill Only
Size	Fits through 4" pipe (Schedule 40 (DN100) Inner Diameter = 4.026" (102.26 mm))
Flow Rate	25–370 gpm (95–1400 lpm)
Static Pressure Rating	29 PSI (2 bar) maximum
Operating Temperature	Operate between **-13° F** (-25° C) to **140° F** (60° C)
Compatibility	See § 3.2.2.2

3.2.2.1 Specific Conditions Of Use

- When inserting the drop tube/valve assembly into the tank riser pipe, use caution not to forcefully impact the tank riser pipe.
- When raising/lowering the drop tube/valve assembly while inside the tank riser pipe, do so in a slow, controlled manner.
- Discharge to ground before putting into service and ensure valve is properly grounded while in service.
- Use caution when inserting a nozzle to not insert it past the flap valve.

3.2.2.2 Compatible Flammable & Combustible Liquids & Fuels

The Franklin Electric DEFENDER SERIES® MaxFill™ Overfill Prevention Valve is intended for use with all US and Canadian approved commercial liquid petroleum fuels and fuel blends. The following table specifies the range of compatible ethanol and biodiesel fuel blends.

Fuel Blend	Compatible Range
Gasoline-Ethanol Blends	E0–E85
Biodiesel Blends	B0–B20

3.2.2.3 Material Specifications

Component	Material
Valve Body	E-Coated Cast Aluminum
Upper Drop Tube	Aluminum or Hard Coat Anodized Aluminum
Lower Drop Tube	Aluminum or Hard Coat Anodized Aluminum
Internal Mechanism	Nickel plated Aluminum, Stainless Steel, Acetal

3.2.3 Required Equipment

- Tape Measure
- Half Round File
- Permanent Marker
- UPP® Pipe Cutter **TOOL*** (110-160 mm): p/n **P.CUT MED**
- UPP® Pipe Cutter **KIT*** (50-110 mm): p/n **708535901** or Metal Saw
    - UPP® **Replacement** Roller Bit: p/n **708530930**
    - UPP® **Replacement** Cutting Wheel: p/n **CW1** (**P.CUT** and **P.CUT MED**)
- Groove Roller Tool*: p/n **708530001**
- OPV Assembly
- 4" Upper Drop Tube Gasket
- Hose Clamp
- Warning Plate

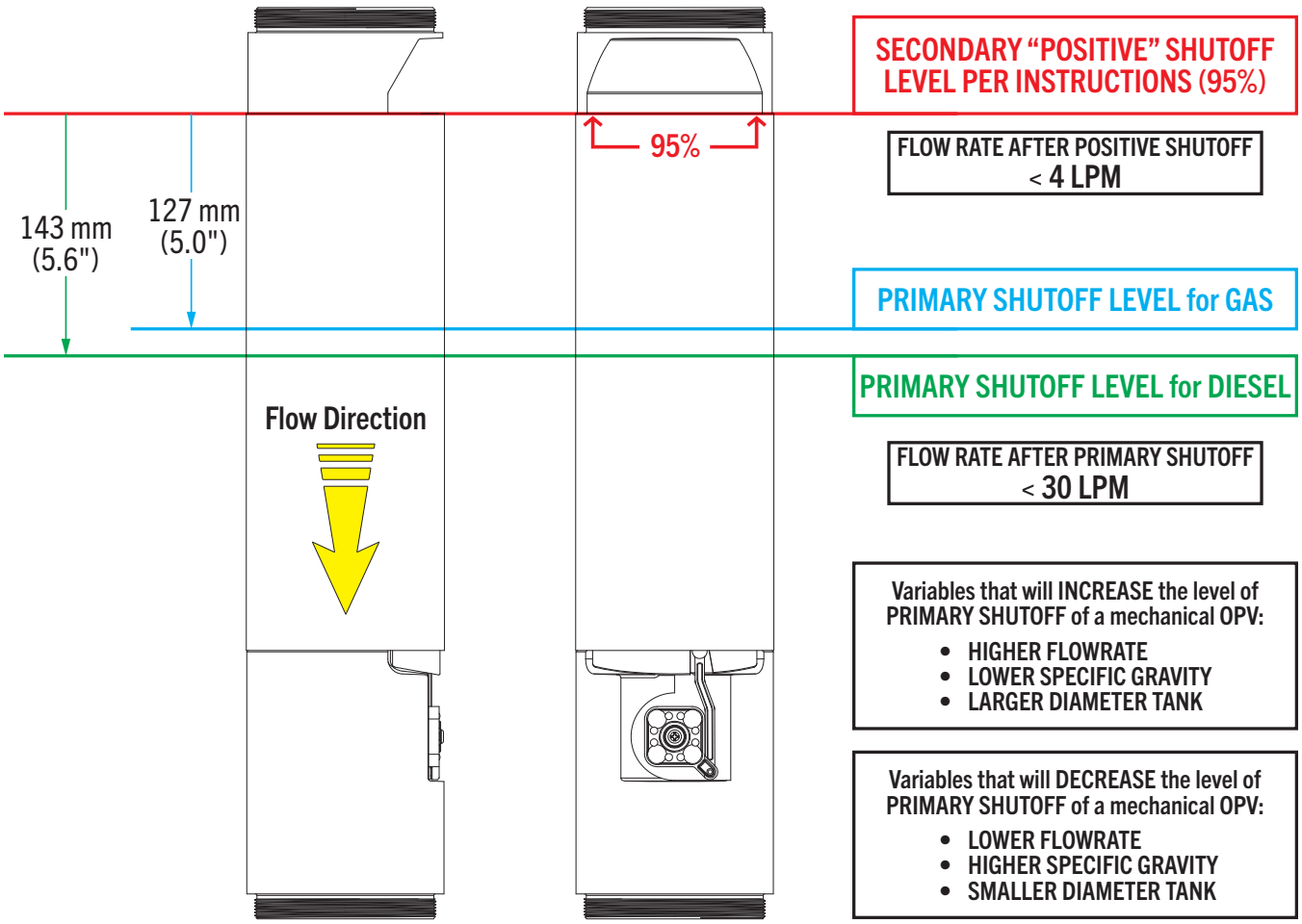
* Refer to the Franklin Electric catalog for ordering information.

4 Installation

⚠ WARNING: If working with drop tubes that have been exposed to fuel or other flammable substances, *allow these substances and any vapors to dissipate in a well-ventilated area* ***for an hour before performing any procedures.***

IMPORTANT: Before beginning any install process, see §3.1.2 to verify that the OPV to be installed is correct product for these installation instructions.

NOTE: When the installation is complete, make sure this guide is left with the service station owner or operator.



4.1 Standard Installation

4.1.1 Determine Drop Tube Lengths

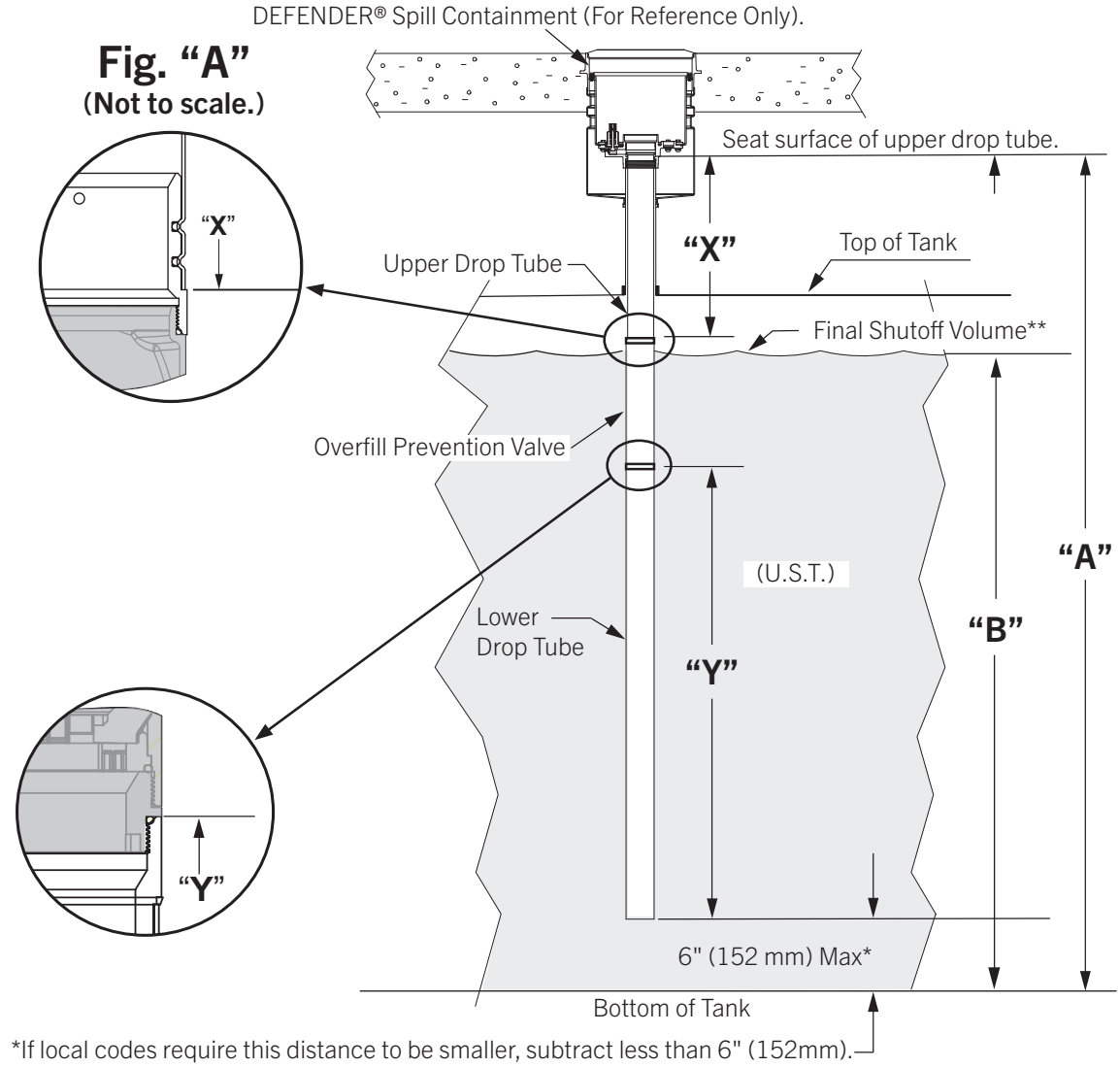


Fig. "B"

Calculate Final Shutoff Volume

Actual Tank Capacity

[ ] Gallons

X (Multiply)

[.95] Typically 95%**

=

[ ] Final shutoff volume (gallons)

[ ] = **B**

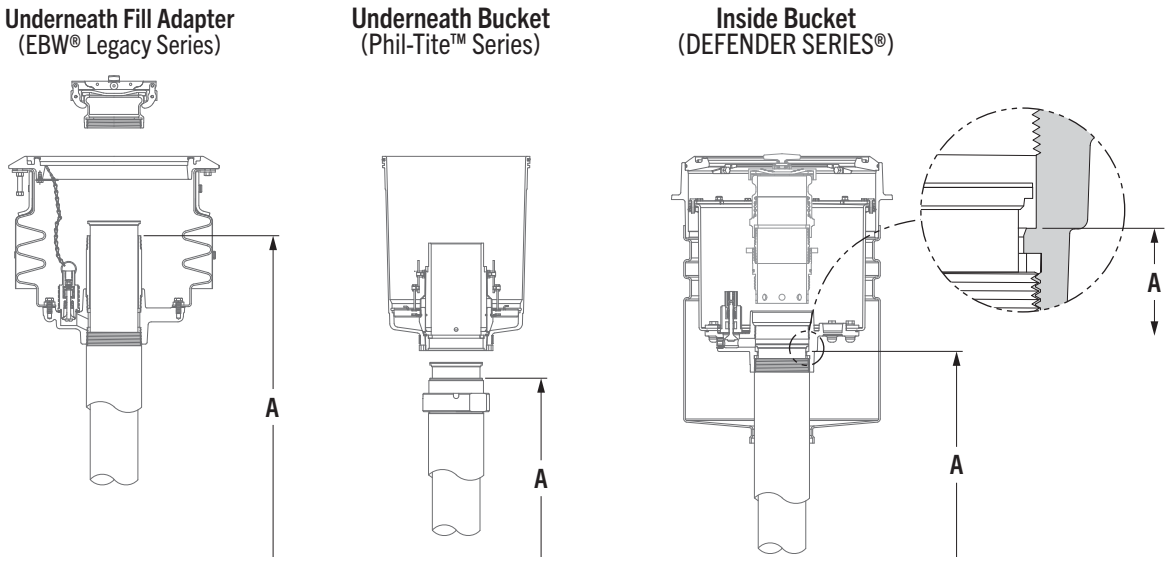
Final Shutoff Volume Height

Fig. "C"

To find Upper Drop Tube length "X"		**To find Lower Drop Tube length "Y"**	
"A" [ ] "	Drop tube seat surface to bottom of tank	**"B"** [ ] "	Final shutoff volume height
- (Subtract)		- (Subtract)	
"B" [ ] "	Final shutoff volume height	[15.75" (400 mm)]	OPV Length Offset
- (Subtract)		- (Subtract)	
[2.5" (63.5 mm)]	Position and mounting adjustment	[6" (152mm)]	Tank bottom clearance
= (Equals)		= (Equals)	
"X" _____ Upper Drop Tube Length		"Y" _____ Lower Drop Tube Length	

NOTE: For exact dimensions, consult the manufacturer's tank charts. Use the actual capacity of the tank for calculations. NFPA30 Guidelines limit tank fill to 95%.

A = The 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 below).*



NOTE:

- If installing into an OPW® spill container, measure from the bottom of the tank to the top face of the OPW® seal adaptor in the OPW® spill bucket.
- If installing into an Emco Wheaton® spill container, measure from the bottom of the tank to Emco Wheaton® spill containment seat surface.

B = FINAL SHUTOFF VOLUME HEIGHT — According to industry recommended practices, Franklin Electric recommends that the final shutoff volume is set to a maximum of 95% of the actual tank capacity. ***To find the final shutoff volume height:***

1. Multiply the actual tank capacity (gallons) by the final shutoff volume percentage. (If using 95% tank volume, multiply the actual tank capacity by .95.)
2. Next locate the closest volume on the tank chart (provided by the tank manufacturer), *and record the corresponding height for "B".*

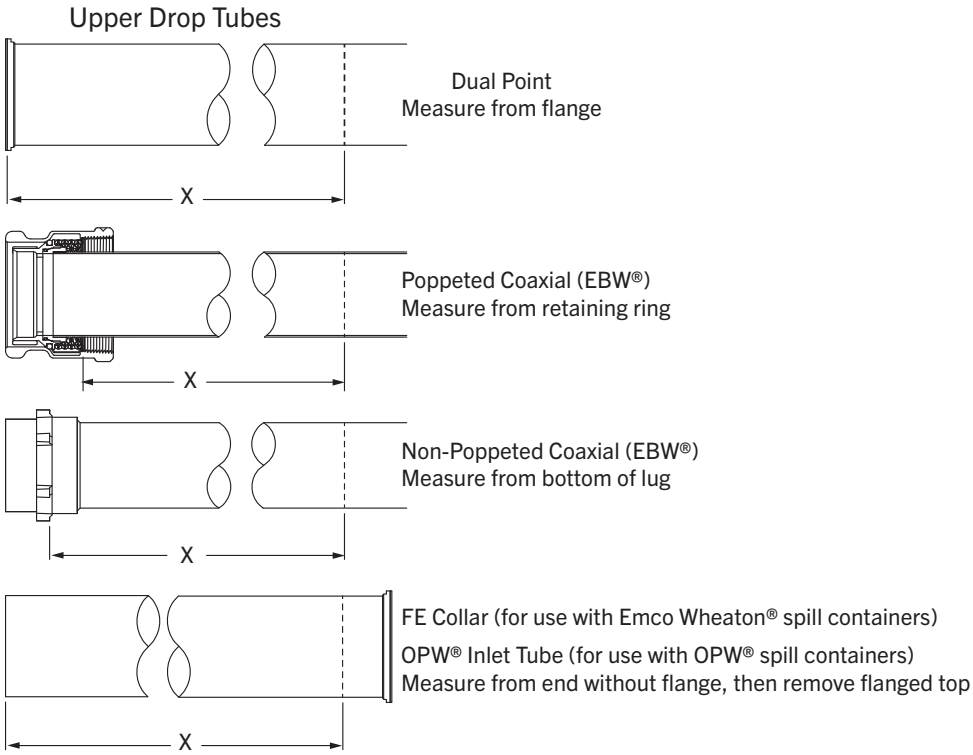
** **NOTE**: To accommodate tank tilt or increased/decreased usage of tank capacity, the final shutoff volume can be adjusted to a value other than 95%, providing it meets all applicable regulatory requirements, and is acceptable to the Authority Having Jurisdiction (AHJ). *If the final shutoff volume is not installed at 95%, the installing contractor should document the new volume as intended and include it with the station records as reference for compliance inspections.* The installing contractor can do this on the OPV Installation Record Sheet (see§6.3) or any other applicable station records.

If the final shutoff volume is installed *greater than 95%,* make sure in all cases that there is at least 250 gallons of ullage volume remaining so that "...none of the fittings located on the top of the tank are exposed to product due to overfilling" according to EPA 40 CFR Part 280.

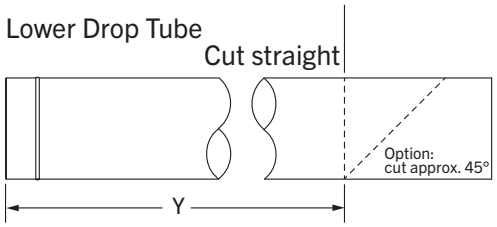
4.1.2 Mark & Cut The Drop Tubes

1. Determine Dimension “A”:
    - Measure from bottom of the underground storage tank to the top face of the FE collar in the spill container. See Fig. “A” (§4.1.1).
2. Determine Dimension “B”:
    - Final shutoff volume height as recommended in Fig. “B” (§4.1.1).
3. Mark the upper drop tube with the length “X”.
    - Use the formula to calculate this. See Fig. “C” (§4.1.1).

    NOTE: Fig. A, B and C are different for DEFENDER SERIES®, OPW® and Emco Wheaton® spill containments. See §4.1.1 for Franklin Electric Defender Series®, §4.2.1.1 for Emco Wheaton® and §4.2.2.1 for OPW® spill containments respectively.



4. Mark the lower tube with the length Y.
    - Use the formula to calculate this (see Fig “C”, (§4.1.1)) and mark the tube.



NOTE: Franklin Electric (FE) recommends the FE pipe cutter (see §3.2.3), *but if using a metal saw to cut the drop tube, make sure to cut it as squarely as possible.* Use the band clamp included with the warning tag as a guide.

5. Use the FE pipe cutter to cut the upper drop tube where marked. (If using an OPW® inlet tube or FE collar for Emco Wheaton®, the flanged end must be removed.)

   NOTE: Tighten the tool handle less than a tenth of a turn for every two times the tool is rotated.

   a. Tighten the blade against the tube just enough to make contact, and then rotate one full turn in one direction.
   b. Rotate one full turn in the opposite direction, and then tighten the cutter approximately one tenth of a turn.
   c. Repeat this process until there is a good scribe line.

   IMPORTANT: Do not overtighten the cutter wheel, otherwise the end of the tube could be crimped, which can cause it to be too small to fit the adapter.

6. Use a half-round file to deburr the inside of the upper drop tube, and then test fit the adapter to see if it fits inside the tube. *If the adapter does not fit, continue deburring, and then test fit the adapter again.* ***If the adapter still does not fit, contact Franklin Electric Technical Service.***

7. Use the FE pipe cutter to cut the lower drop tube where marked.
   - Use a metal saw if the lower drop tube needs to be cut to a 45° angle. *Make sure the lowest point of the drop tube does not extend into the minimum clearance specified by the tank manufacturer (or according to local requirements).*

4.1.3 Install The Upper Drop Tube Adapter

NOTE: This is the interface between the OPV and the upper drop tube.

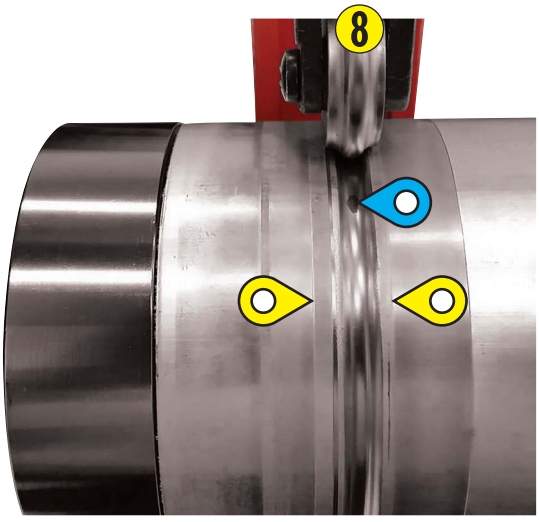
1. Replace the cutting wheel ( ) on the FE pipe cutter ( ) with the roller tool ( ).
2. Start at the cut end of the upper drop tube, and mark the grooves on the tube ( ).

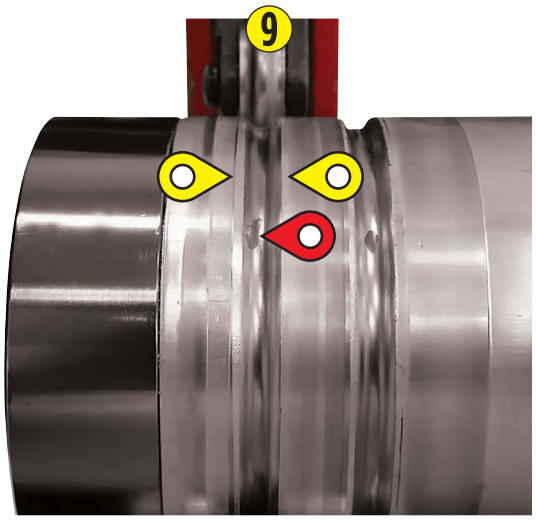
NOTE:

- If installing a FE collar for Emco Wheaton®, skip Step 3 below and follow steps in §4.2.1, "Optional Installation of Emco Wheaton® Spill Containment".
- If installing an OPW® inlet tube, skip Step 3 below and follow the steps in §4.2.2, "OPW® Spill Containment" for cutting the upper drop tube and installing the OPW® inlet tube. (Do not use the FE drop tube gasket. Make sure to use the gasket included with the OPW® inlet tube.) *Proceed to Step 4 below when the installation is complete.*

3. Install the drop tube gasket ( ) on the upper drop tube (dual point installation as shown).
4. Make sure the O-rings are installed on the upper drop tube adapter.
5. Insert the upper drop tube adapter into the cut end of the upper drop tube.

6. Position the roller tool over the mark ( ), and then tighten the roller tool until it makes contact with the upper drop tube.
7. Rotate the roller tool one full turn in one direction, and then rotate it one full turn in the opposite direction.
8. Tighten the roller tool approximately one tenth of a turn, and then repeat the previous step 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 or mark* ( ).
9. Repeat the previous three steps to create a groove over the second mark ( ).



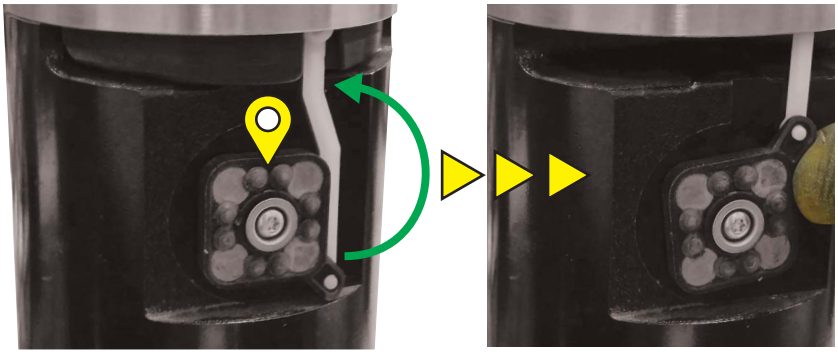


4.1.4 Complete The Installation

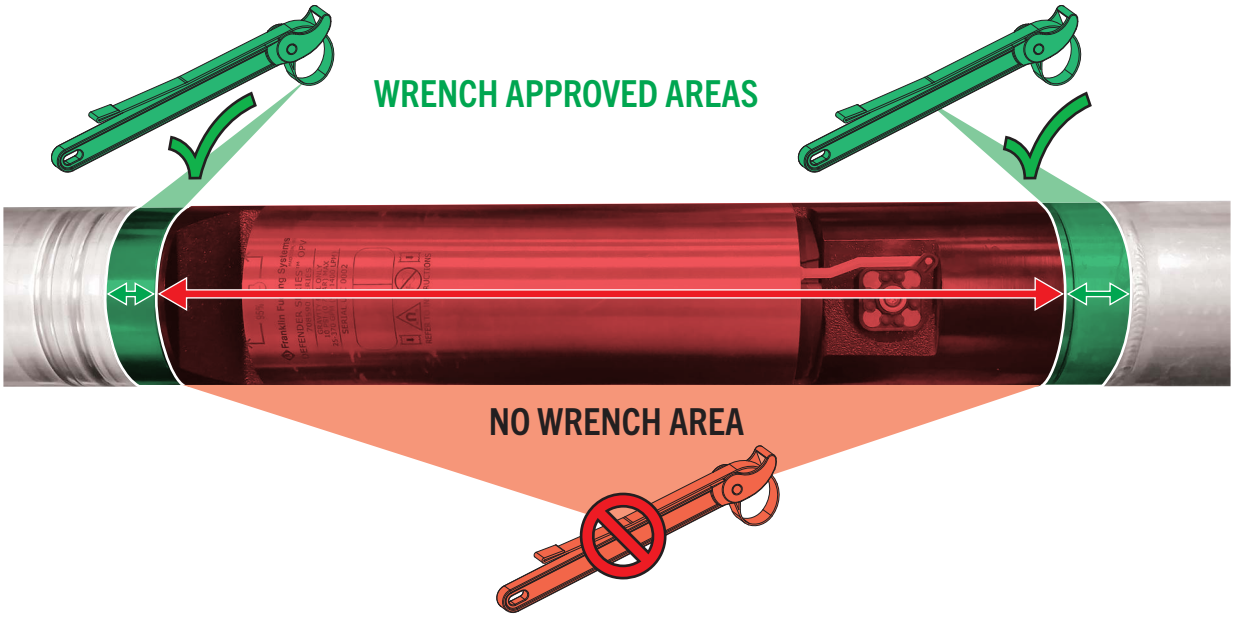
Before installing the OPV, remove any burrs and clean the inside of the tank riser pipe properly. *If not done, the OPV might be damaged or unable to function properly.*

NOTE: The upper and lower threads of the drop tube adapters are lubricated at the factory. ***Do not use pipe sealant.*** *Make sure the O-rings on both ends of the OPV are present and undamaged.*

1. Check the float and flapper mechanism by rotating the outer coupler (📍) counter-clockwise. *Make sure this activates the internal flapper and operates smoothly.*

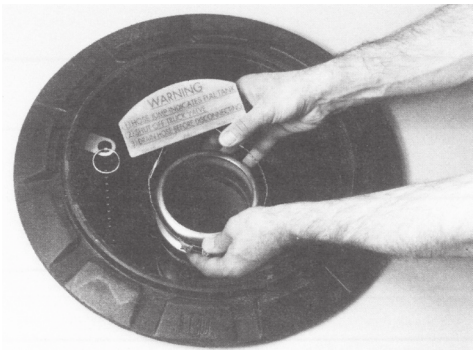


2. Make sure the drop tube gasket is installed under the upper drop tube flange. *See Step 3 of § 4.1.3, "Install the Upper Drop Tube Adapter".*
3. Thread the upper and lower drop tubes onto the OPV, and then use *strap wrenches **(not pipe wrenches)*** to tighten the drop tubes. Position one on the upper drop tube, and the other on the lower drop tube. *Do not tighten the float shield or valve.*



4. Spill containment must be grounded to earth to discharge any static electricity.
5. *Carefully* lower the completed OPV assembly into the riser pipe.

   NOTE: Do not drop the assembly or force it down the riser pipe. *If it does not fit, clean the riser pipe, and attempt to insert the OPV assembly again. If it still does not fit, the riser pipe may need to be replaced.*
6. Reinstall the spill bucket components.
7. Use the stainless steel band clamp to install the warning plate around the 4" (102 mm) riser pipe below the threaded section.



8. Perform the operational inspection procedure.

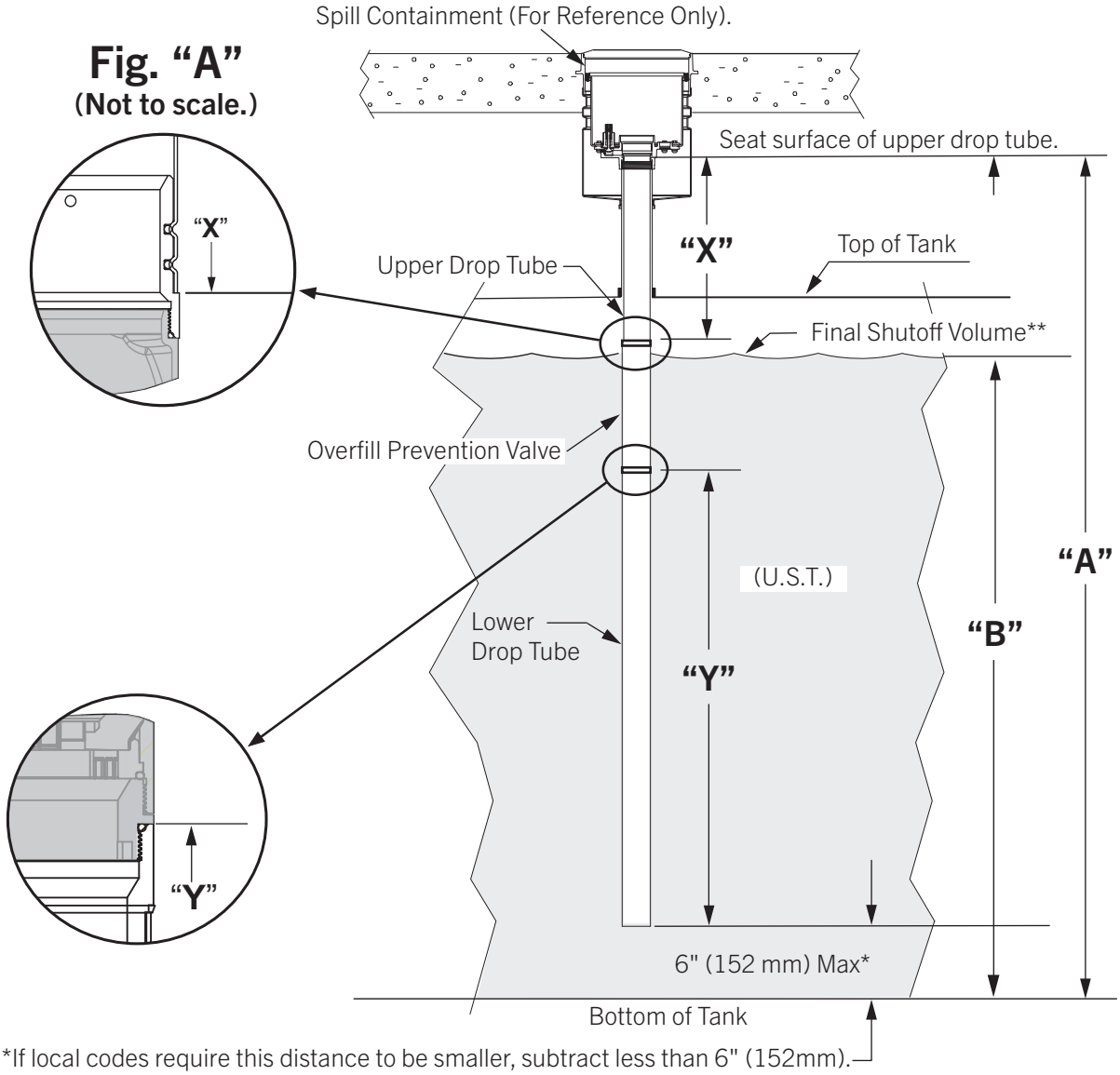
4.2 Optional Installation

4.2.1 Emco Wheaton® Spill Containment

OPV Adapter and Drop Tube

Franklin Electric (FE) collar for use with Emco Wheaton® spill Containers.

4.2.1.1 Emco Wheaton® Determine Drop Tube Lengths



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

Fig. "B"

Calculate Final Shutoff Volume

Actual Tank Capacity

[ ] Gallons

X (Multiply)

[.95] Typically 95%**

=

[ ] Final shutoff volume (gallons)

[ ] = **B**

Final Shutoff Volume Height

Fig. "C"

To find Upper Drop Tube length "X"			**To find Lower Drop Tube length "Y"**		
"A"	"	Drop tube seat surface to bottom of tank	**"B"**	"	Final shutoff volume height
- (Subtract)			- (Subtract)		
"B"	"	Final shutoff volume height		15.75" (400 mm)	OPV Length Offset
- (Subtract)			- (Subtract)		
	3" (76.2 mm)	Position and mounting adjustment		6" (152mm)	Tank bottom clearance
= (Equals)			= (Equals)		
"X" _____ Upper Drop Tube Length			"Y" _____ Lower Drop Tube Length		

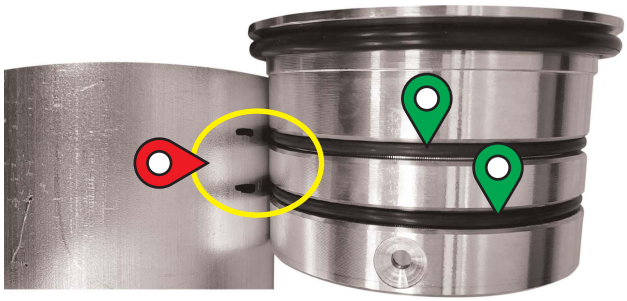
NOTE: For exact dimensions, consult the manufacturer's tank charts. Use the actual capacity of the tank for calculations. NFPA30 Guidelines limit tank fill to 95%.

4.2.1.2 Mark & Cut The Drop Tubes

- See §4.1.2, Steps 1 through 7.

4.2.1.3 Install The Upper Drop Tube Inlet / Collar

1. Replace the cutting wheel (📍) on the FE pipe cutter (📍) with the roller tool (📍).
2. Start at the cut end of the upper drop tube, and mark the grooves on the tube (📍)
3. Ensure the two O-rings are installed on the FE collar groove (📍).



4. Apply petroleum jelly to the collar and O-rings and insert the FE collar into the cut end of the upper drop tube.
5. Position the roller tool over the mark, and then tighten the roller tool until it makes contact with the upper drop tube.
6. Rotate the roller tool one full turn in one direction, and then rotate it one full turn in the opposite direction.
7. Tighten the roller tool approximately one tenth of a turn, and then repeat the previous step 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 or mark.*

8. Repeat the previous three steps to create a groove over the second mark.
9. Ensure the O-ring is installed.
10. Return to Step 4, §4.1.3, “Install the Upper Drop Tube Adapter”.

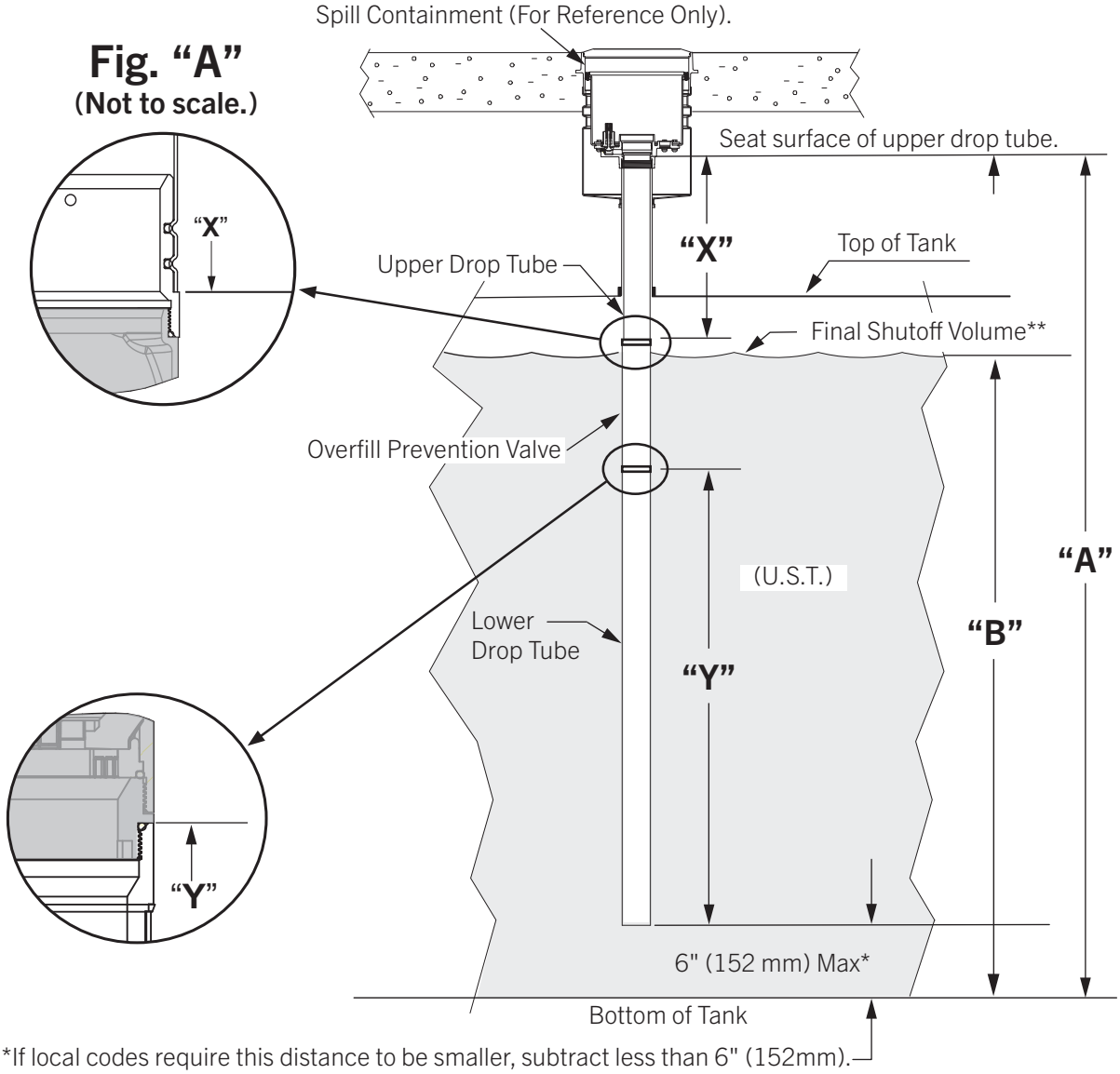
4.2.2 OPW® Spill Containment

OPV Adapter and Drop Tube

OPW® inlet tube for use with OPW® spill containers.

4.2.2.1 OPW® Determine Drop Tube Lengths

Fig. "A"
(Not to scale.)



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

Fig. "B"
Calculate Final Shutoff Volume

Actual Tank Capacity

[ ] Gallons

X (Multiply)

[.95] Typically 95%**

=

[ ] Final shutoff volume (gallons)

[ ] = **B**

Final Shutoff Volume Height

Fig. "C"

To find Upper Drop Tube length "X"		To find Lower Drop Tube length "Y"	
"A" [ ] "	Drop tube seat surface to bottom of tank	"B" [ ] "	Final shutoff volume height
- (Subtract)		- (Subtract)	
"B" [ ] "	Final shutoff volume height	[15.75" (400 mm)]	OPV Length Offset
- (Subtract)		- (Subtract)	
[2.5" (63.5 mm)]	Position and mounting adjustment	[6" (152mm)]	Tank bottom clearance
= (Equals)		= (Equals)	
"X" _____ Upper Drop Tube Length		"Y" _____ Lower Drop Tube Length	

NOTE: For exact dimensions, consult the manufacturer's tank charts. Use the actual capacity of the tank for calculations. NFPA30 Guidelines limit tank fill to 95%.

4.2.2.2 Mark & Cut The Drop Tubes

- See §4.1.2, Steps 1 through 7.

4.2.2.3 Install The Upper Drop Tube / OPW® Inlet Tube

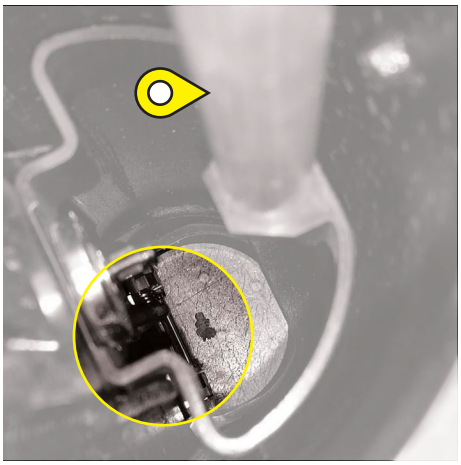
1. Follow Steps 3 through 16 in OPW® 71SO Installation & Maintenance Instructions (H15524PA) referenced in Executive Order VR-102 to cut the upper drop tube and install the OPW® inlet tube.
2. Return to Step 4, §4.1.3, "Install the Upper Drop Tube Adapter".

4.2.3 Operational Inspection – All DEFENDER® OPV Installations

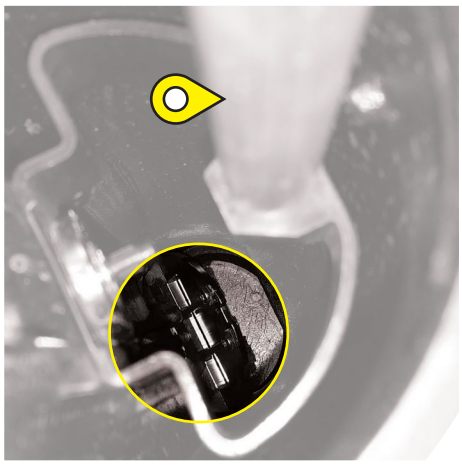
Use the FE remote test tool to inspect the OPV.

1. Assemble the remote test tool with enough extension sections to reach the OPV.

2. Insert the remote test tool (📍) into the drop tube. *A "pull" should be felt when the magnets are positioned correctly and attract.*
3. *Slowly* raise the remote test tool about 1½" (38 mm). *The flapper should be observed moving into the flow path.* ***If the flapper is observed moving back and forth, the OPV is functioning normally.***



Valve Flapper In (not visible)



Valve Flapper Out (visible)

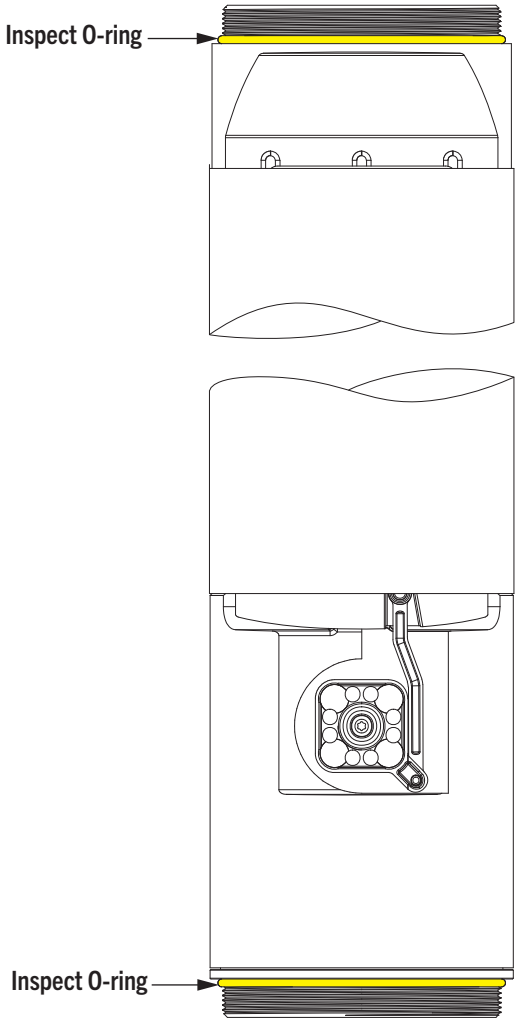
NOTE: If required by a local agency, the flapper may be pushed fully closed by inserting a *non-sparking stick or rod* (no larger than .75" (19 mm) diameter) through the remote test tool opening.

4. Remove the remote test tool by pulling it out of the drop tube. *The magnets disengage and the flapper resets automatically.*

5 Maintenance

The OPV has no periodic maintenance requirements, but if you remove the drop tube and OPV assembly from the tank, inspect the drop tube seal (📍) for wear or damage. Replace it if necessary.

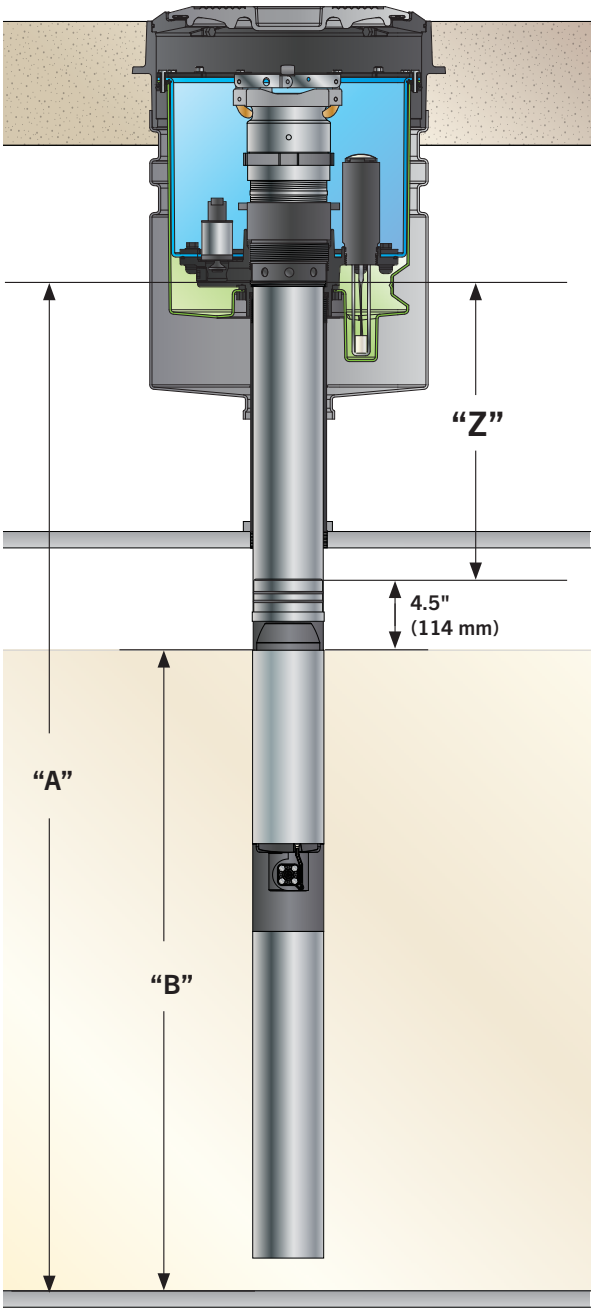
NOTE: If you remove the upper or lower drop tube from the OPV, you should replace the O-ring(s).



5.1 Inspect & Verify The Final Shutoff Level

5.1.1 Direct Fill

NOTE: Do not remove the OPV assembly from the tank to perform this procedure.



DEFINITIONS

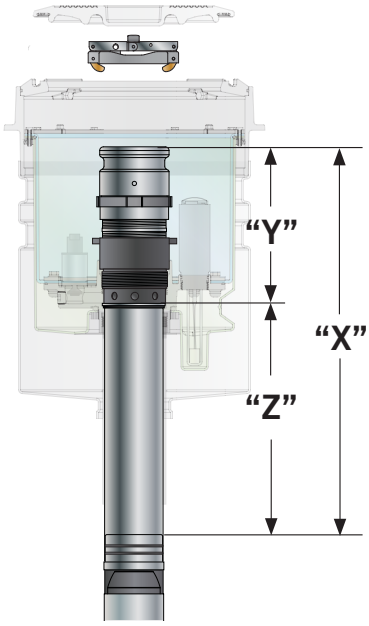
"A" Distance from the upper drop tube to the bottom of the underground storage tank.

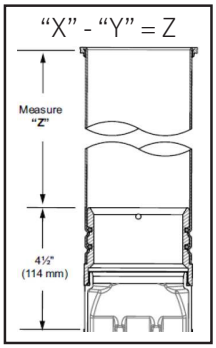
"B" 95% tank volume - obtained from the tank chart provided by the tank manufacturer. To find the 95% tank level on the tank chart, multiply the actual tank capacity by 0.95. Then on the tank chart, find the level measurement that matches the calculated volume the closest.

"Z" Distance from the upper drop tube to the top edge of the upper drop tube adapter.

4.5" Distance from 95% shut-off to the top of upper drop tube adapter.

MEASURING "Z" WITHOUT REMOVING THE FILL ADAPTER

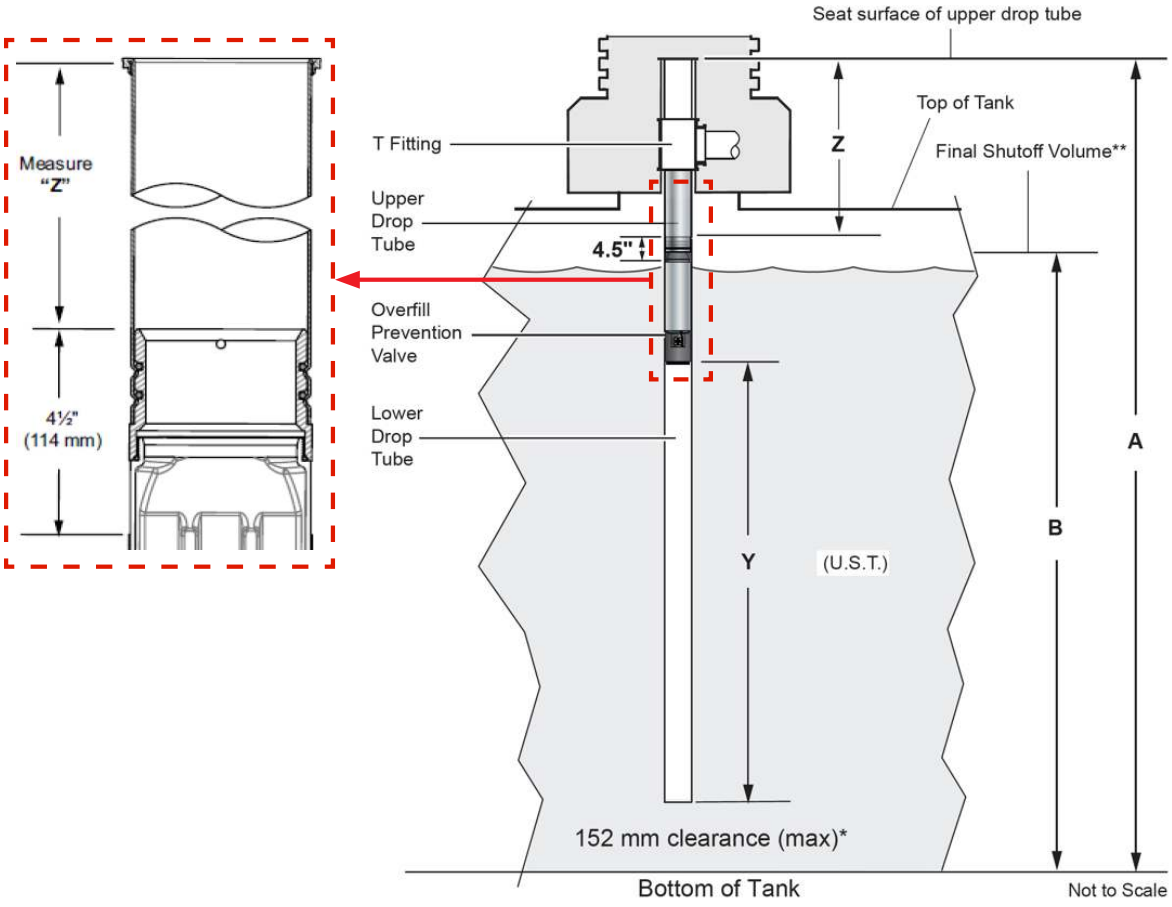




"X" Distance from the top of the fill adapter to the top edge of the upper drop tube adapter.

"Y" Distance from the top of the fill adapter to the top edge of the drop tube flange.

5.1.2 Remote Fill



*If local codes require the tank bottom clearance to be smaller, subtract less than 152 mm.

DEFINITIONS:

A – Distance from the upper drop tube to the bottom of the underground storage tank.

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 0.95. Then on the tank chart, find the level measurement that matches the calculated volume the closest.

Z – Distance from the upper drop tube to the top edge of the upper drop tube adapter.

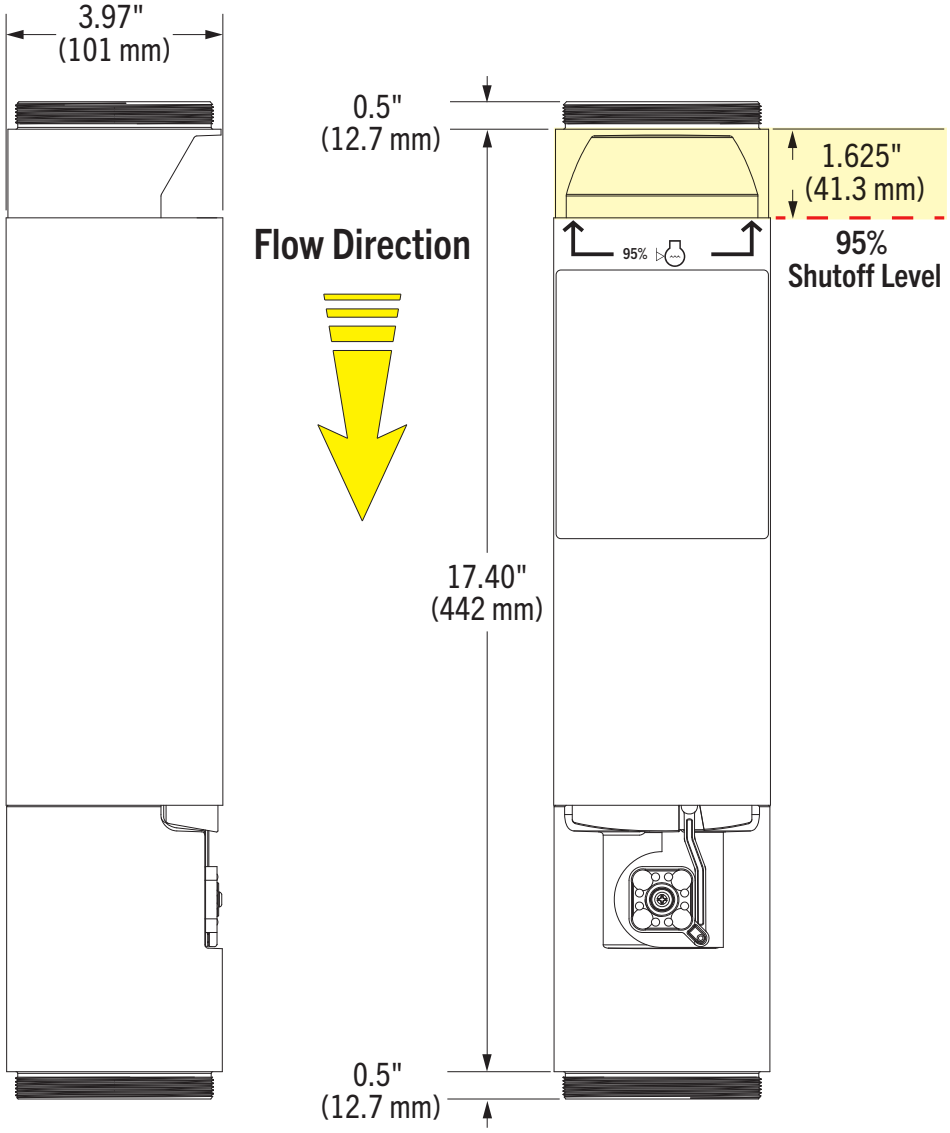
4.5" – Distance from 95% shut-off to the top of upper drop tube adapter.

5.1.3 Inspection Worksheet

UST OVERFILL EQUIPMENT INSPECTION - DEFENDER SERIES® OVERFILL PREVENTION VALVE						
Facility Name:			Owner:			
Address:						
City, State, Zip Code:					Phone:	
Testing Company:			Phone:		Date:	
Product Grade:						
1. REFER TO THE MANUFACTURER'S TANK CHART.						
Tank Volume (gal)						
Tank Diameter (ft)						
95% Tank Volume (gal) (× Multiply Tank Volume by 0.95)						
95% Volume Height (in inches) Based on Calculation Above	**1**	**1**	**1**	**1**	**1**	**1**
2. PERFORM THE OVERFILL PREVENTION VALVE INSPECTION.						
Inspection performed? Flapper moves freely into the flow path?	Yes [ ] No [ ]	Yes [ ] No [ ]	Yes [ ] No [ ]	Yes [ ] No [ ]	Yes [ ] No [ ]	Yes [ ] No [ ]
Measure "A" (in)						
- Subtract "Z" (in)						
- Subtract 4.5 in	- 4.5	- 4.5	- 4.5	- 4.5	- 4.5	- 4.5
= Calculated 95% Final Shutoff Volume Height (in inches) Based on Measurements Above	**2**	**2**	**2**	**2**	**2**	**2**
Difference Between **1** and **2** (equal or less than = pass, greater than = fail)						
3. DETERMINE WHETHER THE OVERFILL PREVENTION VALVE INSTALLATION PASSES THE INSPECTION.						
Find the Final Shutoff Volume in the manufacturer's tank chart. Enter the closest corresponding volume (gal).						
÷ Divide by Actual Tank Capacity (gal)						
× Multiply by 100						
= Equals Final Shutoff Volume %						
If the final shutoff volume percentage is 95% or less, the installation meets Franklin Electric and industry recommended practices. This percentage can, however, exceed 95% as long as the ullage volume remaining is greater than or equal to 250 gallons so that "none of the fittings located on the top of the tank are exposed to product due to overfilling" according to *EPA 40 CFR, Part 280*. The installation must also meet all applicable regulatory requirements, and must be acceptable to the Authority Having Jurisdiction.						
Enter Actual Tank Capacity (gal)						
- Subtract Final Shutoff Volume (gal)						
= Equals Ullage Volume Remaining (gal)						
The OPV passes the installation inspection?	Yes [ ] No [ ]	Yes [ ] No [ ]	Yes [ ] No [ ]	Yes [ ] No [ ]	Yes [ ] No [ ]	Yes [ ] No [ ]
Comments:						
Tester's Name (print) _____ Tester's Signature _____						

6 Appendix

6.1 Dimensional Drawing



6.2 Certifications & Approvals

NOTE: See §3.2.2.1 for “Specific Conditions Of Use”.

Agency	Certification	Standards
UL/ULC	File MH 21090	UL 2583 AND CAN/ULC-S661-10
CARB	VR-101, VR-102 and VR-105	
Florida	EQ-838	
ATEX	CE 0539 Ex **II 1 G Ex h IIB T6 Ga** DEMKO 17 ATEX 1843X	EN IEC 60079-0:2018 EN ISO 80079-36:2016 EN ISO 80079-37:2016
IECEx	**Ex h IIB T6 Ga** IECEx UL 17.0020X	IEC 60079-0, Edition 7.0 (2017-12) ISO 80079-36, Edition 1.0 (2016-02) ISO 80079-37, Edition 1.0 (2016-02)
Kiwa	**EN 13616** K93677/02	EN 13616:2016

6.3 OPV Installation Record Sheet

Date Installed

_____

_____

Valve Serial Number

_ _ _ 5 0 _ _ _ _ _ _ _ 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_____

Final Shutoff Setpoint

_____ Gallons

_____ % Tank Fill

Operational Inspection Procedure Performed

[ ] Yes

[ ] No

Initials _____

Date _____

6.4 Notes

F-9044 r12

May 19, 2025