Underground Storage Tank Overfill Prevention

Presented by

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DISCLAIMER

- The information in this presentation is a summary of requirements specified in California Underground Storage Tank (UST) Regulations, industry standards, and manufacturer procedures for inspecting / testing a few specific types of equipment commonly encountered at UST facilities. It is not all-inclusive. There is no substitute for reading the full text of the regulations and other documents referenced. This information should not be interpreted as endorsement or non-endorsement of any manufacturer's equipment.

OBJECTIVES

The Objectives of this class are to introduce UST inspectors and UST Service Technicians to:

- Requirements for providing UST overfill prevention
- Requirements for inspecting overfill prevention equipment
- A brief summary of how to inspect specific types of overfill prevention equipment and confirm functionality and proper activation level

DEFINITIONS

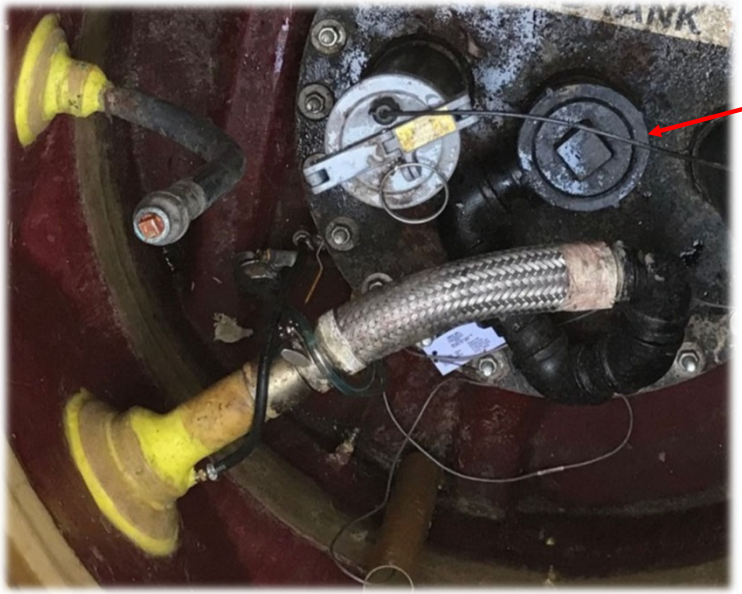
- "**Ball Float" or "Ball Float Valve"** A **flow restrictor** device installed inside the tank on the inlet of the vent riser pipe (and the vapor return riser if the vent and vapor recovery lines enter the tank separately). Rising product lifts a ball, which seals the vent line. Continued filling compresses vapors trapped in the tank, causing back pressure to slow product delivery. The tank must be vapor tight for this to work.

DEFINITIONS

- "**Drop Tube**" A pipe installed inside a tank fill riser that transfers product from the tank fill connection point to the bottom of the tank. Usually made of aluminum or non-ferrous alloy and cut at an angle at the lower end to prevent build-up of static charge from flammable liquid flow.

DEFINITIONS

- "**Extractor Fitting**" A fitting installed on a riser pipe on top of a tank to allow a ball float valve to be removed.



Extractor Fittings

Extractor Wrench

Extractor Caps

DEFINITIONS

- "**Overfill Prevention Valve" aka "Flapper Valve**" A device installed in a tank's drop tube to automatically **shut-off** flow of product into the tank at a pre-set point.

[Note: These devices contain floats which may be inside or outside the valve body. Rising product lifts the float to a point where it closes a "flapper," which prevents further delivery of product. Many valves are two-stage types, with a primary (lower) float which restricts delivery to the tank, causing back-pressure on the delivery hose, which "bucks" to warn the delivery driver to halt further delivery. If filling continues, the second stage (upper) float triggers complete shutoff of delivery.]

Cutaway View

DEFINITIONS

- "**Ullage**" [uhl-ij] The portion of the tank interior that is above liquid level (aka headspace or vapor space).

- "**Voluntary consensus standards**" means standards that shall be developed after all persons with a direct and material interest have had a right to express a viewpoint and, if dissatisfied, to appeal at any point. [23 CCR §2611]

OVERFILL PREVENTION EXEMPTION

- The local UST Program Unified Program Agency (UPA) ***may*** waive the requirement for overfill prevention equipment where the tank inlet exists in an observable area, the spill container is adequate to collect any overfill, and the tank system is filled by transfers of no more than **25 gallons** at one time. [23 CCR §2635(c)(2)]

OVERFILL PREVENTION OPTIONS

- All USTs not exempted pursuant to 23 CCR §2635(c)(2) must be equipped with an overfill prevention system *which does not allow for manual override* and meets one of 5 allowed options. [23 CCR §2635(c)(1)]

- We will refer to the five options as Options A1, A2, B, C and D.

OVERFILL PREVENTION OPTIONS

Options A1 & A2

- 23 CCR §2635(c)(1)(A)

- Alert the transfer operator when the tank is **90%** full by **restricting flow** into the tank; **or**

- Alert the transfer operator when the tank is **90%** full by triggering an **audible and visual alarm**.

OVERFILL PREVENTION OPTIONS

Option B

- 23 CCR §2635(c)(1)(B)

- **Restrict flow** into the tank at least **30 minutes** before the tank overfills, provided the restriction occurs when the tank is filled to no more than **95%** of capacity; **and**

- Activate an **audible alarm** at least **5 minutes** before the tank overfills.

*Note: The requirement to restrict flow 30 minute prior to overfilling means this option is only suitable for **very large tanks***

OVERFILL PREVENTION OPTIONS

Option C

- 23 CCR §2635(c)(1)(C)

- Provide **positive shut-off** of flow to the tank when the tank is filled to no more than **95%** of capacity.

OVERFILL PREVENTION OPTIONS

Option D

- 23 CCR §2635(c)(1)(D)

- Provide **positive shut-off** of flow to the tank so that none of the fittings located on the top of the tank are exposed to product due to overfilling.

OVERFILL PREVENTION OPTIONS

- **Positive shut-off** is most often provided by a mechanical overfill prevention valve (aka "flapper valve") which closes to stop tank filling. Other options include hardware such as air-actuated or electrically-actuated valves.
- **Restriction of flow** is typically provided by a ball float valve on the vent riser pipe, which seals and creates back pressure to slow tank filling as the liquid level rises and compresses the vapors at the top of the tank.
- **Alarms** must be able to be seen/heard **at the tank fill location**.

OVERFILL PREVENTION EQUIPMENT INSPECTION

- Overfill prevention equipment for USTs installed before 10/1/2018 must be inspected by 10/13/2018* and every 36 months thereafter; and within 30 days of completion of a repair. **[23 CCR §2637.2(a)(1)]**

- Overfill prevention equipment for USTs installed on or after 10/1/2018 must be inspected upon installation and every 36 months thereafter; and within 30 days of completion of a repair. **[23 CCR §2637.2(a)(2)]**

* If the initial inspection is done late, the following periodic inspection is due during or before October of 2021. **[23 CCR §2620(e)]**

OVERFILL PREVENTION EQUIPMENT INSPECTION

- Inspections must:
  - Demonstrate that the equipment is set to activate at the correct level and will activate when the stored substance reaches that level. **[23 CCR §2637.2(b)]**

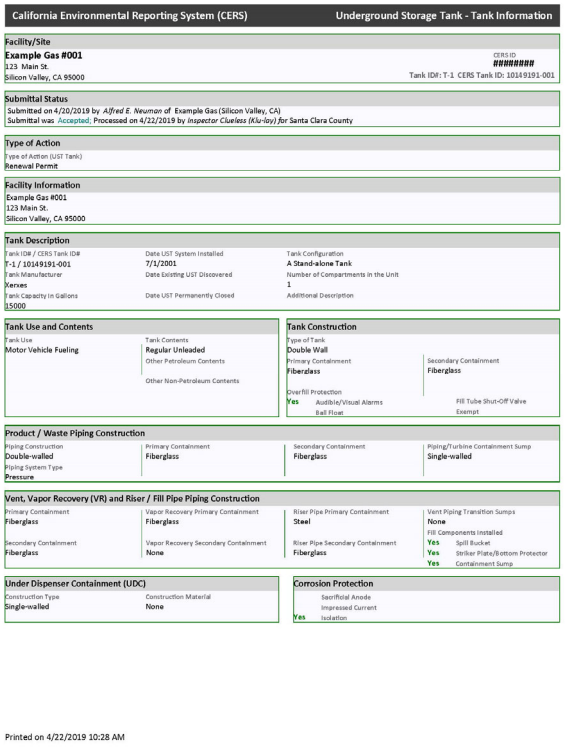
  - Be performed per manufacturer's guidelines or standards. If there are no manufacturer's guidelines or standards, the equipment must be inspected using an applicable method specified in an industry code or engineering standard. If there are no applicable manufacturer's guidelines, industry codes, or engineering standards, an inspection method approved by a state-registered PE must be used. **[23 CCR §2637.2(b)]**

OVERFILL PREVENTION EQUIPMENT INSPECTION

- The UST owner/operator must notify the local Unified Program Agency (UPA) at least 48 hours prior to conducting the inspection. **[23 CCR §2637.2(f)]**
- Inspections must be performed by a UST Service Technician meeting the requirements of 23 CCR §2715(f). **[23 CCR §2637.2(c)]**
- Results of the inspection must be recorded on the "Overfill Prevention Equipment Inspection Report Form" located in Appendix IX of 23 CCR. **[23 CCR §2637.2(d)]**
- The UST owner/operator must submit a copy of the "Overfill Prevention Equipment Inspection Report Form" to the UPA within 30 days of completion of the inspection. **[23 CCR §2637.2(e)]**

PREPARATION FOR EQUIPMENT INSPECTION

- Review California Environmental Reporting System (CERS) UST – Tank Information
- Tank Description
  - Tank Manufacturer
  - Tank Capacity
  - Date UST System Installed
  - Tank Configuration



California Environmental Reporting System (CERS) — Underground Storage Tank - Tank Information

Facility/Site
Example Gas #001
123 Main St.
Silicon Valley, CA 95000
CERS ID: #########
Tank ID#: T-1 CERS Tank ID: 10149191-001

Submittal Status
Submitted on 4/20/2019 by *Alfred E. Neuman* of Example Gas (Silicon Valley, CA)
Submittal was Accepted, Processed on 4/22/2019 by *Inspector Clueless (Klu-less) for* Santa Clara County

Type of Action
Type of Action (UST Tank): Renewal Permit

Facility Information
Example Gas #001
123 Main St.
Silicon Valley, CA 95000

Tank Description
Tank ID# / CERS Tank ID#: T-1 / 10149191-001
Tank Manufacturer: Xerxes
Tank Capacity in Gallons: 15000
Date UST System Installed: 7/1/2001
Date Existing UST Discovered:
Date UST Permanently Closed:
Tank Configuration: A Stand-alone Tank
Number of Compartments in the Unit: 1
Additional Description:

Tank Use and Contents
Tank Use: Motor Vehicle Fueling
Tank Contents: Regular Unleaded
Other Petroleum Contents:
Other Non-Petroleum Contents:

Tank Construction
Type of Tank: Double Wall
Primary Containment: Fiberglass
Secondary Containment: Fiberglass
Overfill Protection: Yes — Audible/Visual Alarms; Ball Float; Fill Tube Shut-Off Valve; Exempt

Product / Waste Piping Construction
Piping Construction: Double-walled
Piping System Type: Pressure
Primary Containment: Fiberglass
Secondary Containment: Fiberglass
Piping/Turbine Containment Sump: Single-walled

Vent, Vapor Recovery (VR) and Riser / Fill Pipe Piping Construction
Primary Containment: Fiberglass
Secondary Containment: Fiberglass
Vapor Recovery Primary Containment: Fiberglass
Vapor Recovery Secondary Containment: None
Riser Pipe Primary Containment: Steel
Riser Pipe Secondary Containment: Fiberglass
Vent Piping Transition Sumps: None
Fill Components Installed: Yes — Spill Bucket; Yes — Striker Plate/Bottom Protector; Yes — Containment Sump

Under Dispenser Containment (UDC)
Construction Type: Single-walled
Construction Material: None

Corrosion Protection
Sacrificial Anode
Impressed Current
Yes — Isolation

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PREPARATION FOR EQUIPMENT INSPECTION

- Tank Manufacturer

Tank Description		
Tank ID# / CERS Tank ID#	Date UST System Installed	Tank Configuration
T-1 / 10149191-001	7/1/2001	A Stand-alone Tank
Tank Manufacturer	Date Existing UST Discovered	Number of Compartments in the Unit
Xerxes		1
Tank Capacity in Gallons	Date UST Permanently Closed	Additional Description
15000		

  - Q. Why does this matter?
  - A. Tank dimensions and capacities vary by manufacturer

PREPARATION FOR EQUIPMENT INSPECTION

- Tank Capacity

Tank Description		
Tank ID# / CERS Tank ID#	Date UST System Installed	Tank Configuration
T-1 / 10149191-001	7/1/2001	A Stand-alone Tank
Tank Manufacturer	Date Existing UST Discovered	Number of Compartments in the Unit
Xerxes		1
Tank Capacity In Gallons	Date UST Permanently Closed	Additional Description
15000		

- Q. Why does this matter?
- A. Need to use the correct tank chart (i.e., capacity and diameter)

PREPARATION FOR EQUIPMENT INSPECTION

- Date UST System Installed

Tank Description		
Tank ID# / CERS Tank ID#	Date UST System Installed	Tank Configuration
T-1 / 10149191-001	7/1/2001	A Stand-alone Tank
Tank Manufacturer	Date Existing UST Discovered	Number of Compartments in the Unit
Xerxes		1
Tank Capacity In Gallons	Date UST Permanently Closed	Additional Description
15000		

- Q. Why does this matter?
- A1. Determines what equipment configurations are allowed
- A2. Tank dimensions and capacities can vary depending on date of manufacture

PREPARATION FOR EQUIPMENT INSPECTION

- Tank Configuration

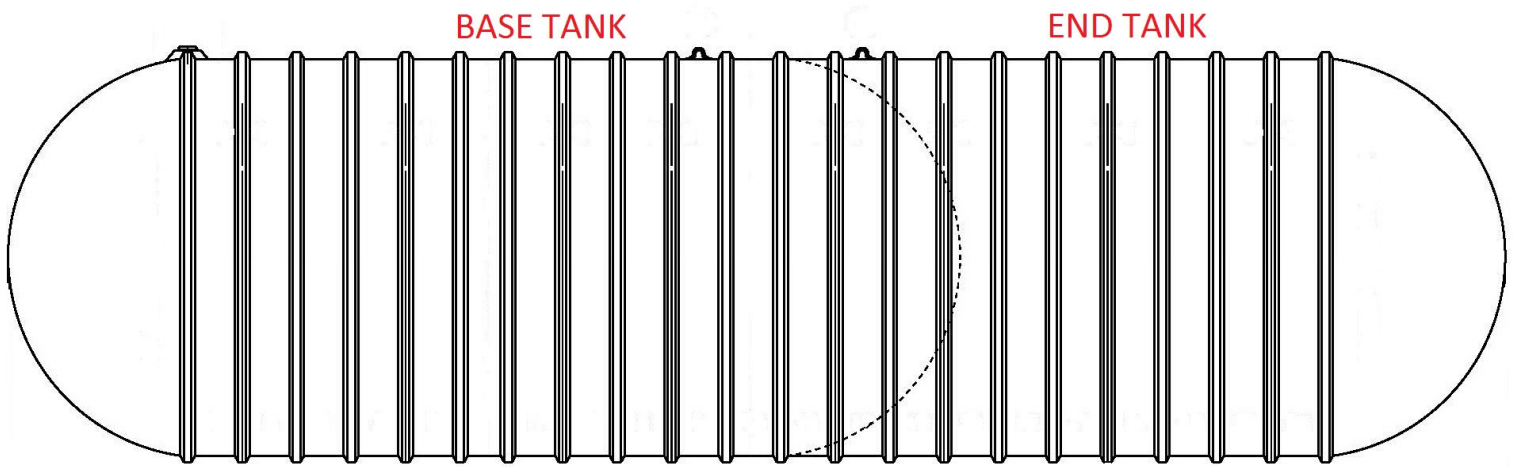
Tank Description		
Tank ID# / CERS Tank ID#	Date UST System Installed	Tank Configuration
T-1 / 10149191-001	7/1/2001	A Stand-alone Tank
Tank Manufacturer	Date Existing UST Discovered	Number of Compartments in the Unit
Xerxes		1
Tank Capacity In Gallons	Date UST Permanently Closed	Additional Description
15000		

- Q. Why does this matter?
- A. Different compartments have different dimensions

Tank Configuration	Tank Configuration
A Stand-alone Tank	One in a Compartmented Unit
Number of Compartments in the Unit	Number of Compartments in the Unit
1	2

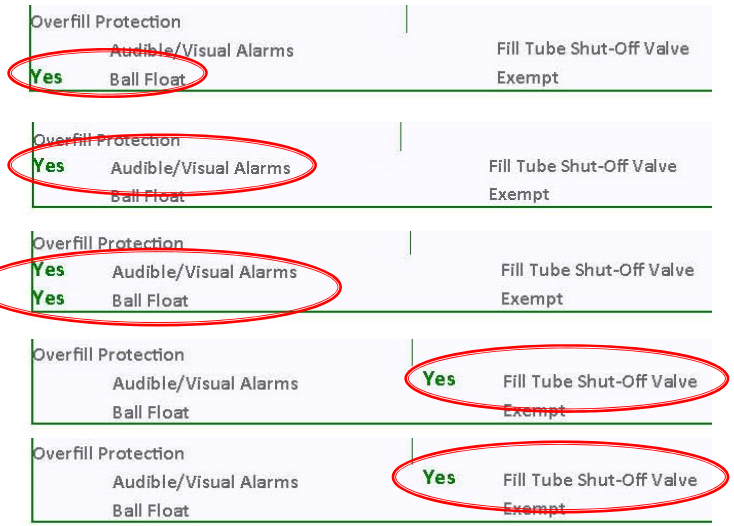
PREPARATION FOR EQUIPMENT INSPECTION

- Tank Configuration (Compartmented fiberglass tank)



PREPARATION FOR EQUIPMENT INSPECTION

- Which option is used to comply with requirement for overfill prevention?



§2635(c)(1)(A) Option A1

§2635(c)(1)(A) Option A2

§2635(c)(1)(B) Option B

§2635(c)(1)(C) Option C

§2635(c)(1)(D) Option D

This determines what equipment needs to be inspected and at what level it must activate

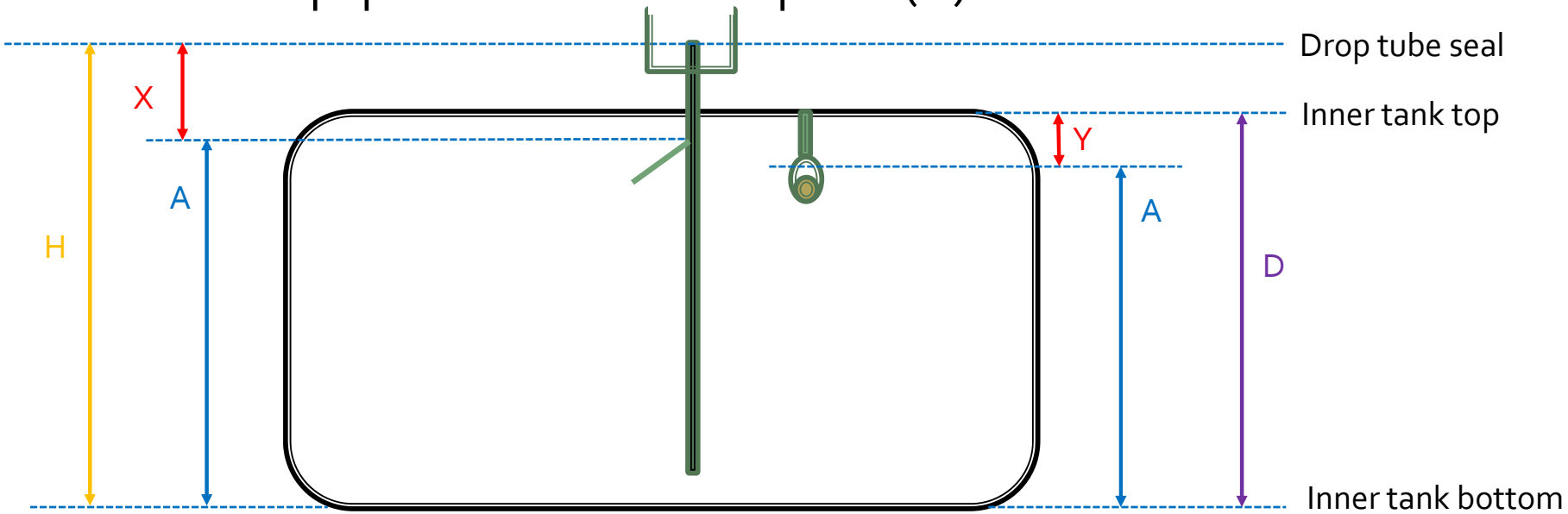
PREPARATION FOR EQUIPMENT INSPECTION

- Beware of…

- Ball floats interfering with operation of flapper valves
- Mechanical overfill prevention valve on used oil tank *(will not work since a dry-break connection and minimum flow rate are required)*
- Incorrect tank diameter measurements due to fill risers threaded into buried manways and riser pipes extending into the tank
- Facilities with direct-buried fill risers or single-wall underground vent lines wanting to switch to using audible & visual alarms *(okay only if UST installed before 7/1/1987)*

PREPARATION FOR EQUIPMENT INSPECTION

- Where is the equipment's activation point (A)?



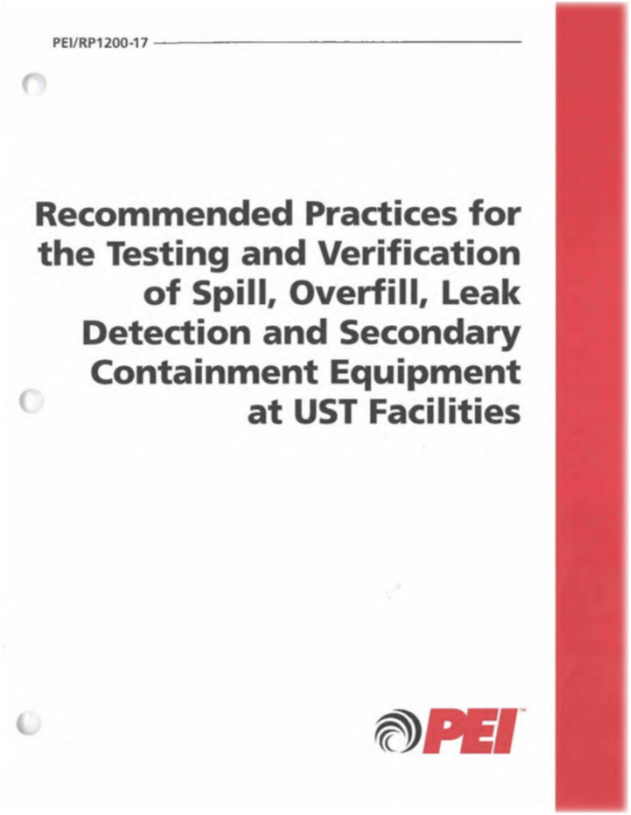
Flapper Valve A = H - X

Convert A to gallons using tank chart. Shutoff percent = (A gallons) divided by tank capacity gallons times 100

Ball Float A = D - Y

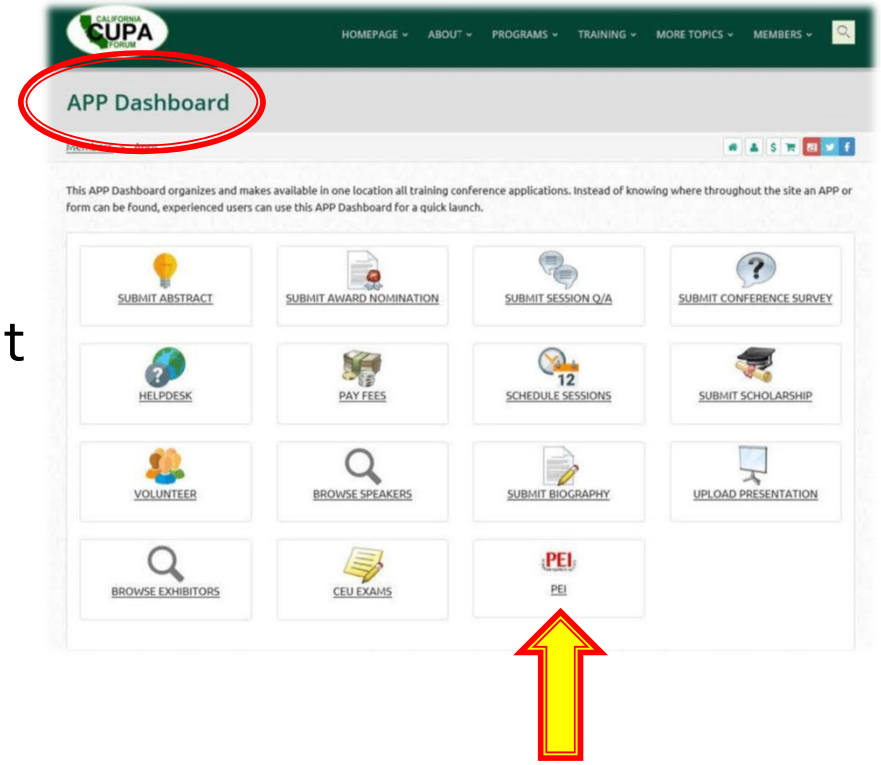
SUMMARY OF RP1200 INDUSTRY STANDARD

- The Petroleum Equipment Institute (PEI) publishes voluntary consensus (industry) standards.
- RP1200-17 is the 2017 edition of PEI's "Recommended Practices for the Testing and Verification of Spill, Overfill, Leak Detection and Secondary Containment Equipment at UST Facilities"



SUMMARY OF RP1200 INDUSTRY STANDARD

- The California CUPA Forum provides Unified Program Agency members free access to PEI standards via Techstreet Enterprise. Login to your account, access the APP Dashboard at https://calcupa.org/member-dashboard/index.html, and click on the PEI button.



SUMMARY OF RP1200 INDUSTRY STANDARD

Inspection of Mechanical Overfill Prevention Valves

- Remove drop tube
- Visually inspect valve and float(s) for damage or corrosion
- Manually move float mechanism(s) to ensure free movement
- Confirm that the flapper will move into the product flow path
- If possible, verify that the bypass valve is open and free of blockage
- Using manufacturer's procedure, examine drop tube and shutoff valve to determine if product flow will shut off when tank is ≤95% full
- Reinstall drop tube
- Pass Criteria = Device functions as designed and complete shutoff of product flow occurs when tank is no more than 95% full

SUMMARY OF RP1200 INDUSTRY STANDARD

Inspection of Ball Float Valves

- Verify that all tank-top fittings are vapor-tight
- Remove ball float assembly
- Visually inspect the float and cage and remove debris or foreign objects
- Check ball for holes and cracks, free movement in the cage, and corrosion affecting proper operation
- Check vent orifice to confirm that it is located near top of tank and open
- Using manufacturer's procedure, confirm that vapor flow is restricted when tank is ≤90% full
- Reinstall ball float
- Pass Criteria = Ball float functions as designed, flow restriction occurs when the tank is no more than 90% full, and tank-top fittings are vapor-tight
- Fail if tank is equipped with suction piping or coaxial Stage I vapor recovery

SUMMARY OF RP1200 INDUSTRY STANDARD

Inspection of ATG Overfill Alarms

- Measure product level at ATG probe riser and compare to ATG console reading
- Verify that ATG is programmed to activate the external overfill alarm unit when the tank is ≤90% full
- Confirm that overfill alarm circuit is operational
- Activate overfill alarm to confirm operation
- Disconnect the ATG probe cable and remove probe from tank
- Inspect probe and confirm that floats move freely
- Reconnect ATG probe cable

SUMMARY OF RP1200 INDUSTRY STANDARD

Inspection of ATG Overfill Alarms *(continued)*

- Move fuel float to the middle of probe and confirm that ATG panel shows correct product height
- Slowly move fuel float up probe until overfill alarm triggers
- At point where alarm triggered, measure distance from bottom of probe to bottom of fuel float
- Using tank chart, find volume that corresponds to float height and determine percent of tank capacity
- Compare measurement to the value programmed in ATG console
- Reinstall probe
- Pass Criteria = Alarm activates when tank is ≤90% full and fuel level on ATG console agrees with stick reading

"TESTABLE" OVERFILL PREVENTION VALVES

- While some manufacturers claim their overfill prevention valves can be inspected without being removed from the tank, their inspection procedures do not fully confirm that the overfill prevention equipment is set to activate at the correct level specified in 23 CCR §2635(c)(1) and will activate when regulated stored substance reaches that level.

- If a manufacturer's procedures do fully not satisfy both requirements of the inspection, the inspection method defaults to industry standard.

OVERFILL PREVENTION VALVES

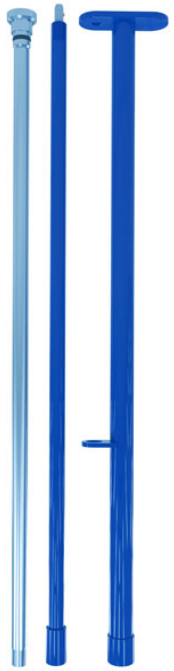
- There are three manufacturers whose equipment is approved for use with gasoline USTs, and their overfill valves can only be installed for the specific Air Quality Executive Order they are listed under.

  [Note: Diesel USTs can use any of the overfill valves with practically no limitations.]
- Each manufacturer has their own calculation procedures and functionally tests, and all inspectors must follow them when determining the actual shut off level and proper valve operation

EMCO-WHEATON A1100 FLAPPER VALVES

- Remove valve from tank
- Inspect for corrosion / other damage
- Take measurements
- Use correct tank chart
- Confirm proper activation level
- Confirm Primary Float and Flapper Valve proper operation using test tools

Test Tools →



Model A0081-1100

Model A0081-1101

EMCO-WHEATON A1100 FLAPPER VALVES

- Newer valves have a "95%" reference mark. When product level reaches this point on the valve, shutoff of flow occurs.

Reference Mark

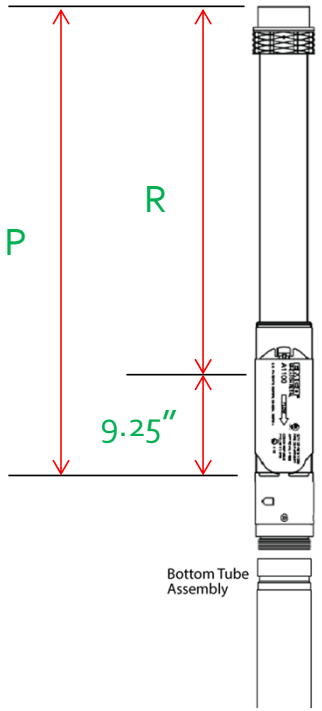
EMCO-WHEATON A1100 FLAPPER VALVES

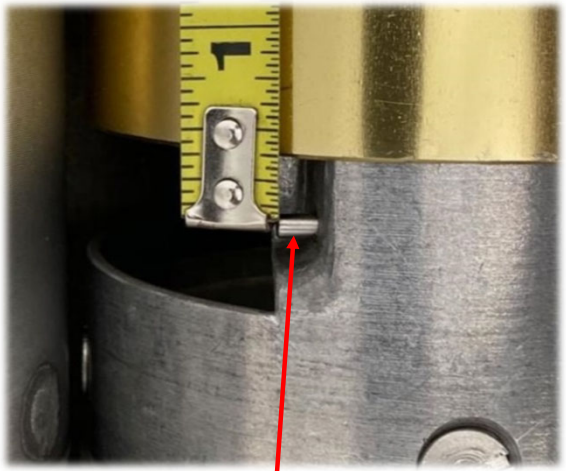
To calculate Actual Shutoff Level for valves **with reference mark**…

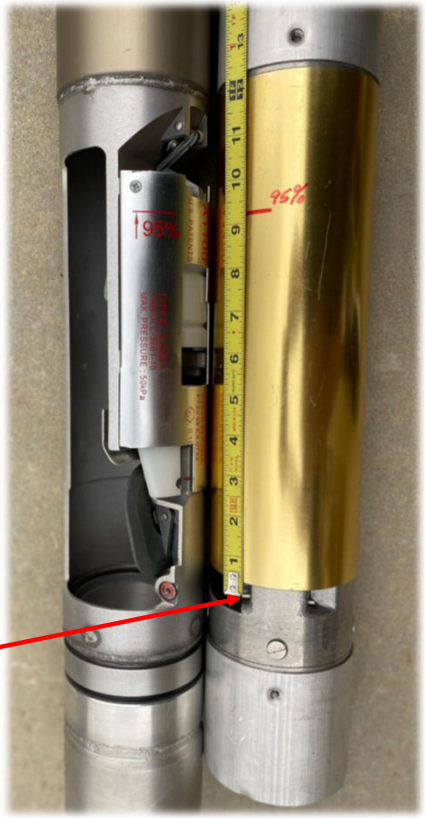
- A = Distance from drop tube seal surface to tank bottom
- R = Distance from drop tube seal surface to 95% reference mark
- X = Shutoff product height = A – R
- Y = Tank internal diameter (100% volume height from tank chart)
- Find gallon readings for X & Y (tank chart)
- Shutoff % = X gallons / Y gallons x 100

EMCO-WHEATON A1100 FLAPPER VALVES

- Older valves **without reference mark**





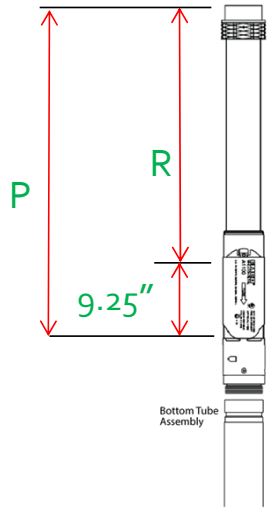


Pin in Primary Float Pocket

EMCO-WHEATON A1100 FLAPPER VALVES

To calculate Actual Shutoff Level for valves **without** reference mark…

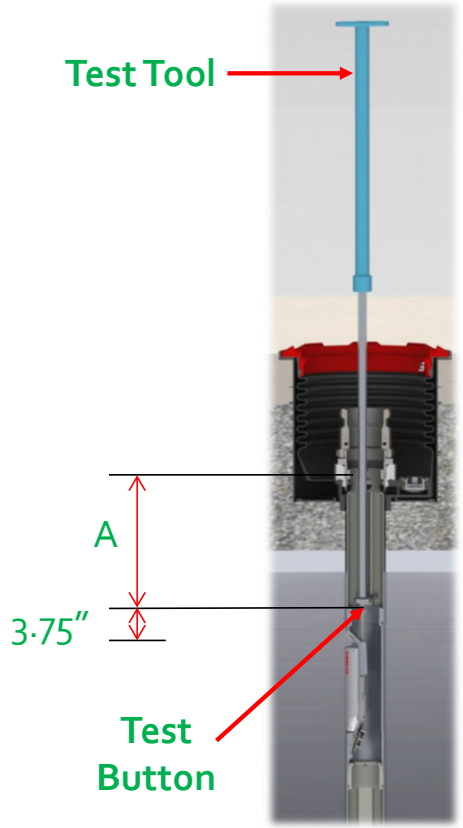
- A = Distance from drop tube seal surface to tank bottom
- P = Distance from drop tube seal surface to pin in primary float pocket
- X = Shutoff product height = A – P + 9.25”
- Y = Tank internal diameter (100% volume height from tank chart)
- Find gallon readings for X & Y (tank chart)
- Shutoff % = X gallons / Y gallons x 100



EMCO-WHEATON A1100-T FLAPPER VALVES

To calculate Actual Shutoff Level

- C = Distance from drop tube seal surface to tank bottom
- A = Distance from drop tube seal surface to test button
- X = Shutoff product height = C – A - 3.75”
- Y = Tank internal diameter (100% volume height from tank chart)
- Find gallon readings for X & Y (tank chart)
- Shutoff % = X gallons / Y gallons x 100

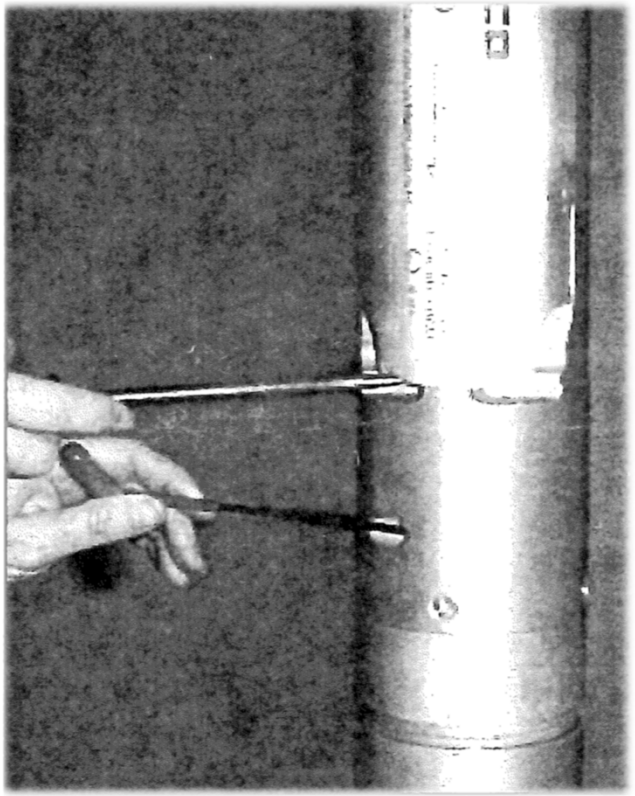


EMCO-WHEATON A1100 FLAPPER VALVES

- Slowly Insert the Model A0081-1101 test tool from the bottom of the lower tube until the hook end secures.
- With the flapper valve latched open, and the hook end secured, gently tug on the test tool, the flapper valve must remain open.
- Using a scribe tool, lift bottom left hand corner of the primary float to unlatch the flapper valve; the test tool should move about 3" downward and flapper will close.

EMCO-WHEATON A1100 EVR FLAPPER VALVES

- Confirm Primary Float and Flapper Valve functionality by removing the test plug using a 1/8" allen wrench.
- Using a 9/64" allen wrench placed inside opening min. 3 times attempt to turn wrench counter-clockwise. It should not turn.
- Using a scribe tool lift bottom left hand corner of the primary float.
- The 9/64" allen wrench now should turn approximately 90 degrees closing the valve .

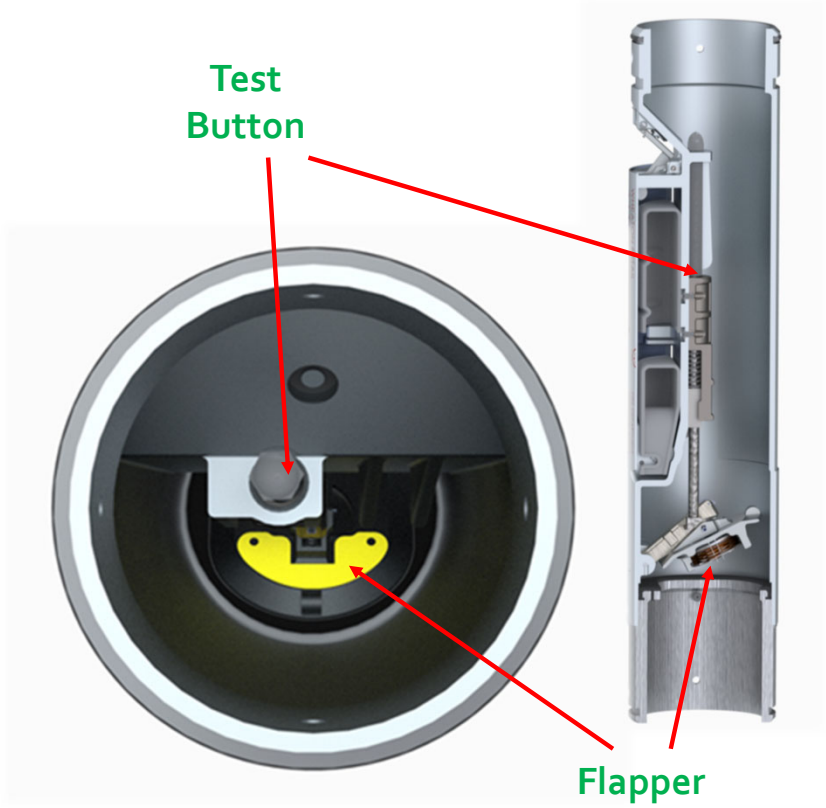


EMCO-WHEATON A1100-T FLAPPER VALVES

- Confirm flapper functionality by inserting model A00081-1100 Test Tool to depress test button and linkage

[Note: Test without removing the valve from the riser.]

- Shine light down interior of valve (alternatively, snap a photo). If reflective tape is visible, valve is OK



EMCO-WHEATON A1100 FLAPPER VALVES

- Inspector must have current California UST Service Technician certification and manufacturer's training
  - Emco-Wheaton Phase I EVR and Phase II EVR Systems Certification

FRANKLIN FUELING SYSTEMS (FFS) / EBW AUTOLIMITER® II FLAPPER VALVES

- Remove valve from tank
- Inspect for corrosion / other damage
- Open inspection port and confirm flapper functionality per "EBW Auto Limiter II Valve Component Inspection Procedure" on pages 10-12 of installation instructions
- Take measurements
- Use correct tank chart
- Confirm proper activation level

FFS / EBW AUTOLIMITER® II FLAPPER VALVES

- D = Distance from drop tube seal surface to tank bottom
- R = Distance from drop tube seal surface to machined ring on valve marked "95%"
- X = Shutoff product height = D – R
- Y = 100% volume height (from tank chart)
- Find gallon readings for X & Y (tank chart)
- Shutoff % = X gallons / Y gallons x 100

95% Ring

FFS DEFENDER SERIES® FLAPPER VALVES

- Take measurements while valve is still inside the tank
- Remove valve from tank
- Inspect for corrosion / other damage
- Reinstall valve
- Confirm shutoff using remote FFS tool

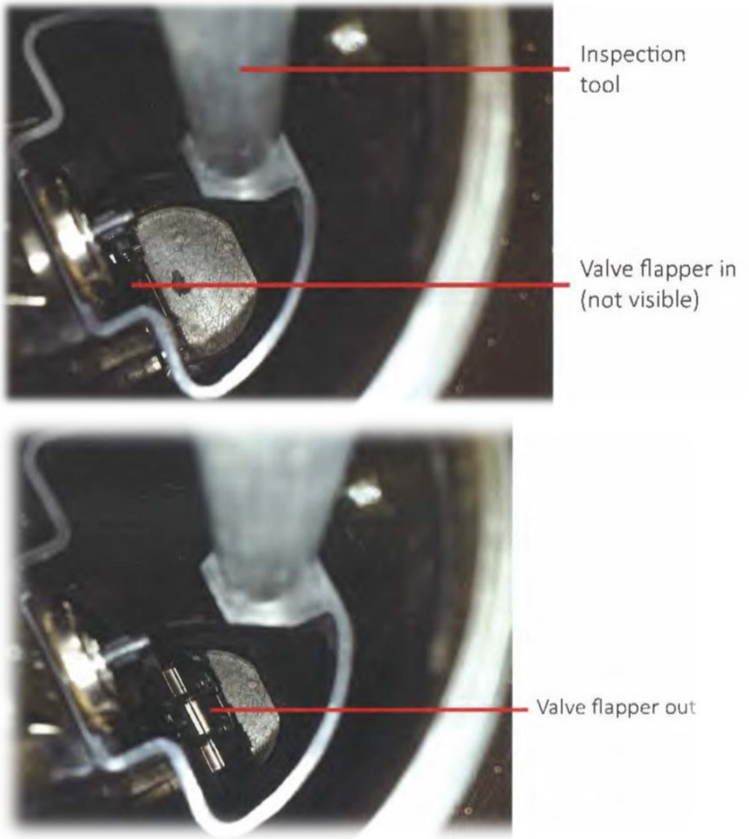
Note: If required by a local agency, you can push flapper fully closed by inserting a non-sparking stick or rod (no larger than .75" diameter) through the remote test tool opening

- Use correct tank chart

Note: The Defender Series® is the only product currently available with full shutoff @ 95%.

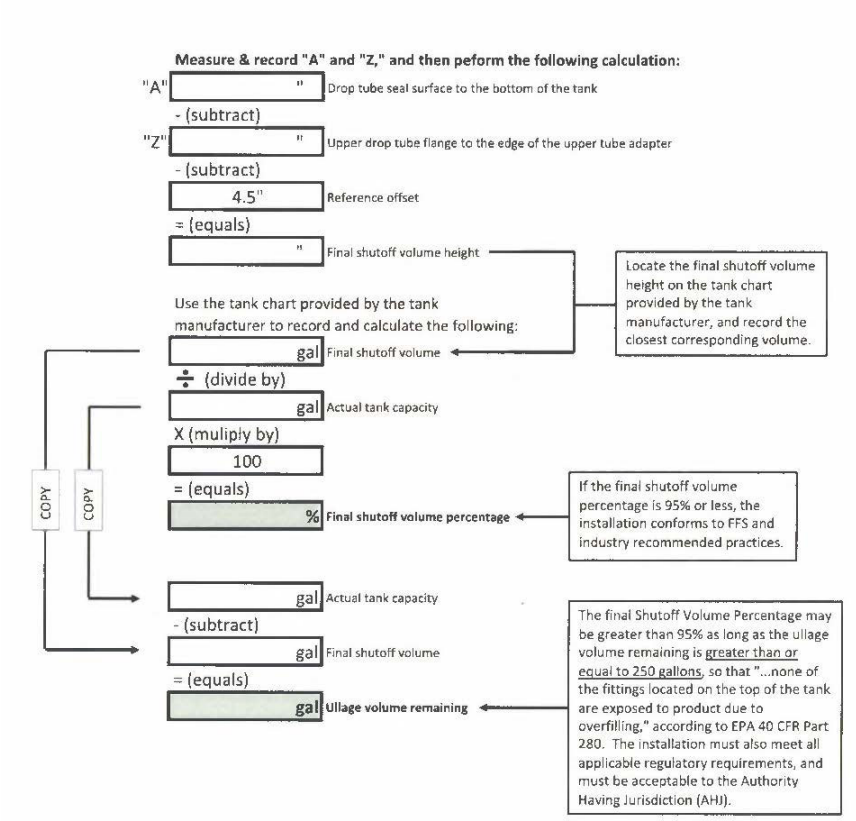
FFS DEFENDER SERIES® FLAPPER VALVES

- Valve actuation requires use of the correct Defender Series® overfill prevention valve remote testing tool



FFS DEFENDER SERIES® FLAPPER VALVES

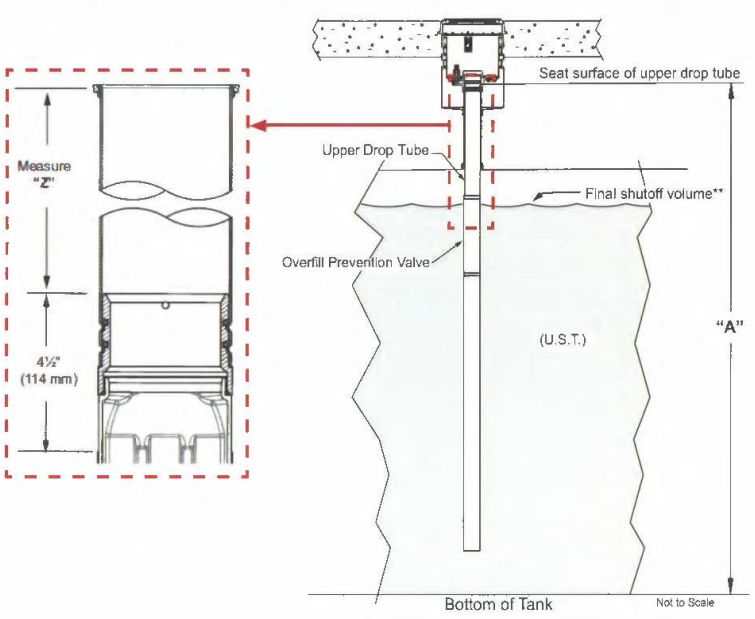
- Confirm proper activation level as described on page 17 of FFS' "Defender Series® Overfill Prevention Valve Installation Guide"



FFS DEFENDER SERIES® FLAPPER VALVES

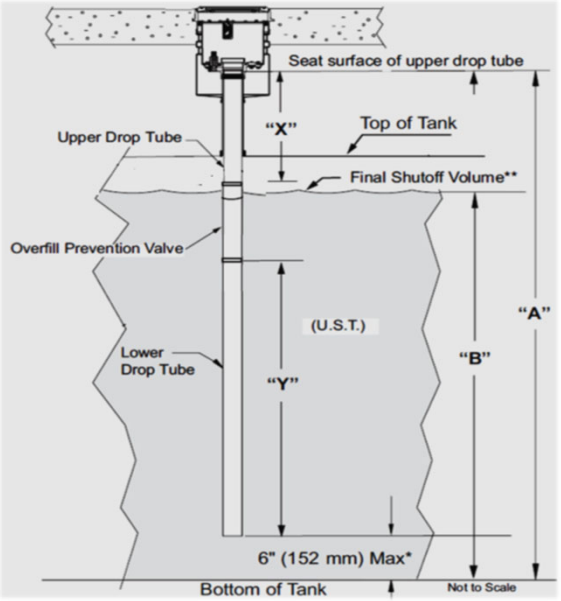
To calculate Actual Shutoff Level

- A = Distance from drop tube seal surface to tank bottom
- Z = Upper drop tube flange to the edge of the upper tube adapter
- X = Shutoff product height = A – Z – 4.5”
- Y = Tank internal diameter (100% volume height from tank chart)
- Find gallon readings for X & Y (tank chart)
- Shutoff % = X gallons / Y gallons x 100



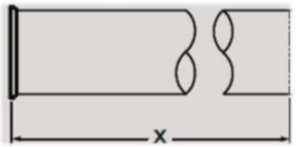
FFS DEFENDER SERIES® FLAPPER VALVES

- Drop Tube Overfill Prevention Device: Defender Series® in **OPW Spill Container**
  - Defender Series® OPV Drop Tube Preparation:
    - Reference Franklin Fueling Systems Defender Series® Overfill Prevention Valve Installation Guide
      - Determine Dimension "A"
        - Measure from bottom of tank to top of OPW face seal adaptor in OPW spill container
      - Determine Dimension "X"
        - Measure required length for the upper drop tube from the non-flanged end
        - Remove the flanged top
    - Follow steps 3 to 16 in OPW 71SO Installation & Maintenance Instructions (H15524PA) referenced in Executive Order VR-102 to cut upper drop tube and install OPW inlet tube



OPW Inlet Tube for use with OPW spill containers

Remove flanged top of upper drop tube



FFS / EBW FLAPPER VALVES

- Inspector must have current California UST Service Technician certification and manufacturer's training
  - FFS EVR Phase I Systems – VR-101 Certification

CERTIFICATE OF COMPLETION

Franklin Fueling Systems

This is to certify that

Eggs Ample

has been certified in:

FFS EVR Phase I Systems - VR-101

Training Date: Feb 19, 2018

Certification # 1234567890

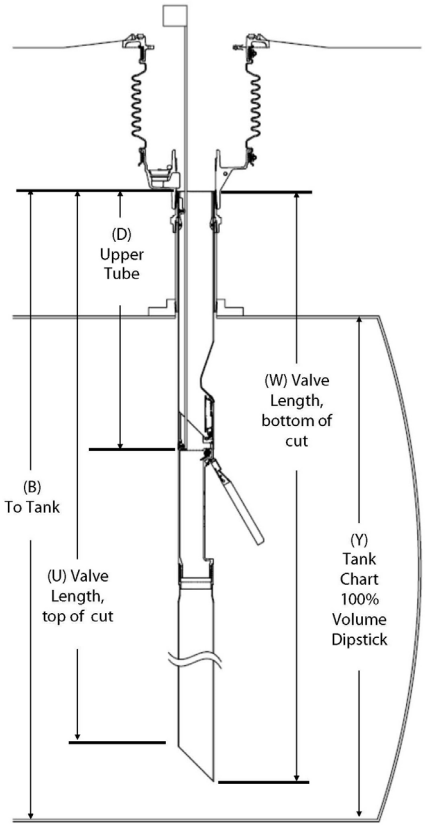
Expiration Date: Feb 19, 2020

FFS PRO

The person named on this certificate of completion has demonstrated knowledge of the listed products and installation by completing an exam provided by Franklin Fueling Systems via FFS PRO: University. This certification is valid for two years from the training date listed.

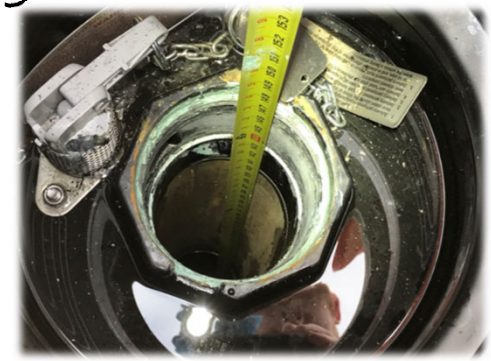
OPW 61SO & 71SO FLAPPER VALVES

- Remove valve from tank
- Inspect for corrosion / other damage
- Visually confirm valve shutoff
- Take measurements
- Use correct tank chart
- Confirm proper activation level by completing page 1 of Appendix B from OPW's "Installation and Maintenance Instructions"



OPW 61SO & 71SO FLAPPER VALVES

- B = Drop tube seal surface to tank bottom
- D = Length of upper tube
- X = Shutoff product height = B – D - 2”
- Y = 100% volume height (from tank chart)
- Find gallon readings for X & Y (tank chart)
- Shutoff % = X gallons / Y gallons x 100



Appendix B

71SO Overfill Valve in Tank Shut off Level Worksheet

Important: **This is meant to be supplemental worksheet and not a substitute to following the installation manual instructions. All length measurements are in inches. Please contact the Authority Having Jurisdiction (AHJ) and review local, state, and national codes to determine the regulatory requirements governing shut-off capacity in your region, as well as take into account other considerations such as extreme tank tilt.**

Take the following measurements with the valve installed in the tank:

Distance from the 71SO inlet tube flange to the cast lug in the 71SO body (see figures), upper tube length.
Note: the Upper Tube Length must be at least 16” to include the protective bend in the tube.

(D) = _____

Distance from the 71SO inlet tube flange to the top and bottom of lower tube, valve length.
(W) = _____
(U) = _____

Distance from the 71SO inlet tube flange to the bottom of the tank. Note: If a tank bottom protector is present it may be necessary to add this thickness to dimension (OPW 6111 & 61TP models add 0.6”)
(B) = _____

From the tank calibration chart provided by tank manufacturer find the dipstick number (Y) which corresponds to the 100% volume.
(Y) = _____

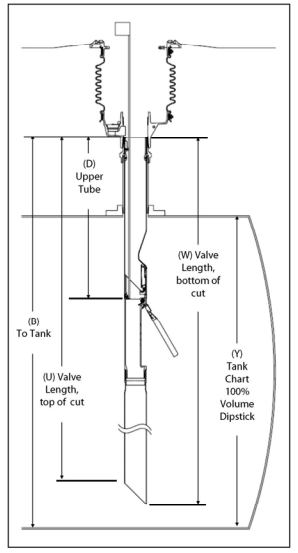
1. To determine shut-off percentage:
Subtract upper tube length (D) from distance to tank bottom (B)
(X) = (B) – (D) - 2” = _____

Using the tank calibration chart provided by the tank manufacturer determine the tank capacity at the calculated (X) dimension and the 100% volume (Y) tank capacity.

(X) tank capacity in gallons = _____

(Y) tank capacity in gallons = _____

SO% = (X) capacity / (Y) capacity x100 = _____



Note: The overfill valve must be installed per AHJ requirements and all applicable local, state, and national codes. If the overfill valve is set above the allowable shut-off percentage the overfill valve must be removed and replaced. For reference 40 CFR part 280 Subpart B Section 280.20 overfill valves should be set to a maximum of 95%.

21

OPW 61SO & 71SO FLAPPER VALVES

- With the float in the normal (down) position visually inspect the valve to ensure the poppet is not exposed outside the deflection shield.
- Inspect the float by lifting upward. The float should move freely without any binding.

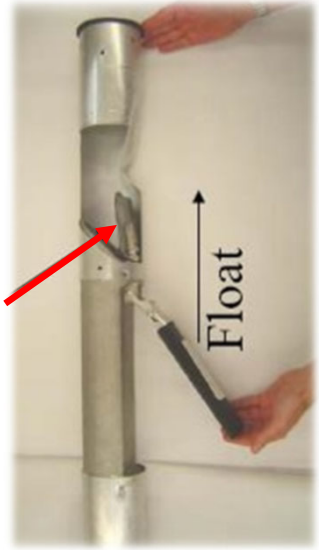
Good Valve

Deflection Shield with Poppet protected

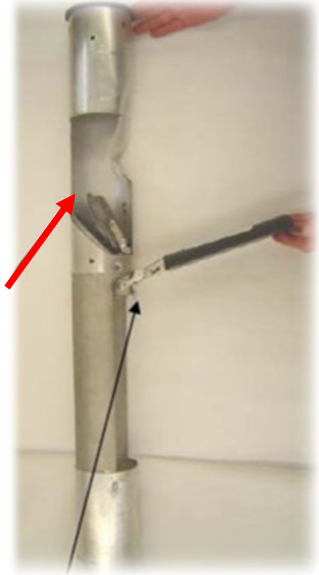
Bad Valve

Deflection Shield with Poppet exposed

Open

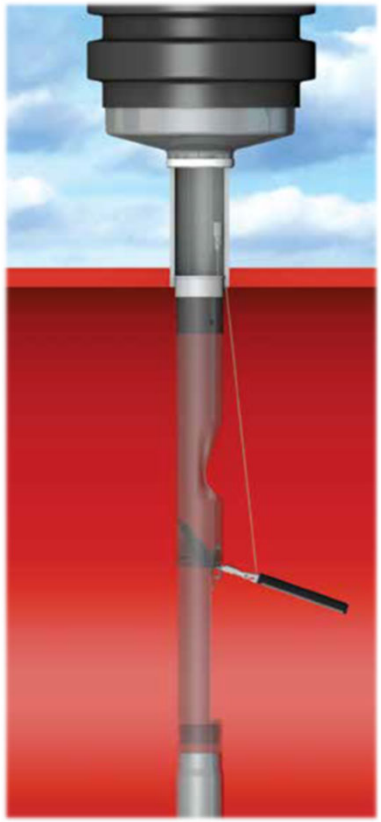


Closed



OPW 71SO-T FLAPPER VALVES

- The 71SO-T Overfill Prevention Valve is advertised as being testable without removal from the tank, but that does not satisfy 23 CCR §2637.2 36 month inspection.
- Manufacturer's procedure can be used for annual test only if done:
  - Loosen test plug.
  - Lift float with cable to simulate fill.
  - Validate proper poppet operation.



OPW 61SO & 71SO FLAPPER VALVES

- Inspector must have current California UST Service Technician certification and manufacturer's training
  - OPW EVR Phase I Certification


OPW
A DOVER COMPANY

Installer Attestation No. P

Eggs Ample

VR-102- UST

Attended Installation Training for EVR Phase I by OPW, Inc.

On: Exp Date:

Completion of this training course does not create a warranty or guaranty by OPW of your installation and/or maintenance of nozzles, vapor recovery systems and EVR PHASE I systems. This training course does not eliminate the need to strictly adhere to manufacturer instructions and procedures when installing and maintaining nozzles, vapor recovery systems and EVR PHASE I Systems. All nozzles, vapor recovery systems and EVR PHASE I Systems must be installed and maintained in accordance with manufacturer instructions and procedures. Attestation applies ONLY to tested named individual.

VEEDER-ROOT OVERFILL ALARMS

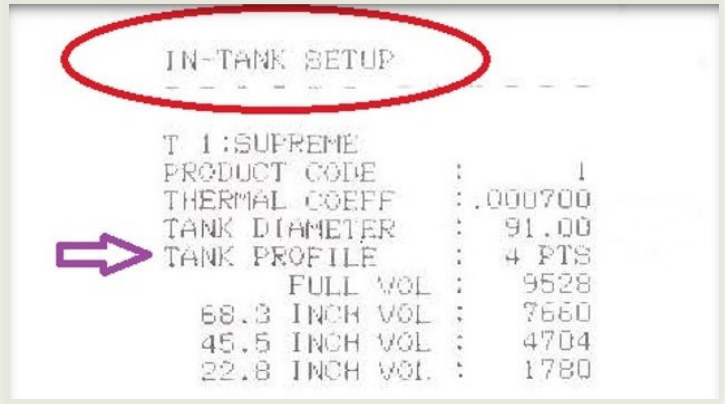
- Measure product level and confirm accuracy of automatic tank gauge (ATG) reading
- Review "In Tank Setup"
- Compare "Tank Profile" to correct tank chart
- Alarm at or near tank fill?
- Inspect ATG probe
- Visual alarm works?
- Audible alarm works?

Bottom of Float (measure point)

```
IN-TANK SETUP

T 1:SUPREME
PRODUCT CODE      :        1
THERMAL COEFF     :  .000700
TANK DIAMETER     :    91.00
TANK PROFILE      :   4 PTS
        FULL VOL  :     9528
   68.3 INCH VOL  :     7660
   45.5 INCH VOL  :     4704
   22.8 INCH VOL  :     1780

FLOAT SIZE:          4.0 IN.
WATER MINIMUM :        0.000

WATER WARNING     :      0.8
HIGH WATER LIMIT:        2.0
WATER ALARM FILTER:    HIGH

MAX OR LABEL
        VOLUME    :     9528

HIGH PRODUCT
          % MAX   :     95.0
      (GALLONS)   :     9052

OVERFILL LIMIT
          % MAX   :     90.0
      (GALLONS)   :     8575
```

VEEDER-ROOT OVERFILL ALARMS

- Tank Profile Options *(from TLS-3XX Series Consoles System Setup Manual, Appendix B)*
  - 1 Point only for horizontally installed, flat-ended cylindrical tanks (i.e., most steel tanks)
  - 4 Points minimum for tanks with curved ends (i.e., fiberglass tanks)
  - *More points means more accuracy*



VEEDER-ROOT OVERFILL ALARMS

- Audible alarm volume and duration are not programmed in the TLS console
- Volume adjustment screw and duration adjustment dial (zero to 60 seconds) are located in the external overfill alarm unit

VEEDER-ROOT OVERFILL ALARMS

- Inspector must have current California UST Service Technician certification and manufacturer's training
  - Same certification as for TLS console monitoring system certifications

Technical Training Certification

Certificate of Completion

This certificate is issued in recognition that

Eggs Ample

Technician #

has satisfactorily completed

Veeder-Root ATG Technician

ATG Monitoring Systems - TLS-450PLUS, TLS4c, TLS4i, TLS-450, TLS-3XX

Installation, Programming, and Service

J. Paul Kaper, Manager, Service NPI

Date of Issue

VEEDER-ROOT

Expiration Date

Things Nik Has Seen

- You… are… coming… OUT!!!

Things Nik Has Seen

- Who made this?

Things Nik Has Seen

- Where's the float?

Things Nik Has Seen

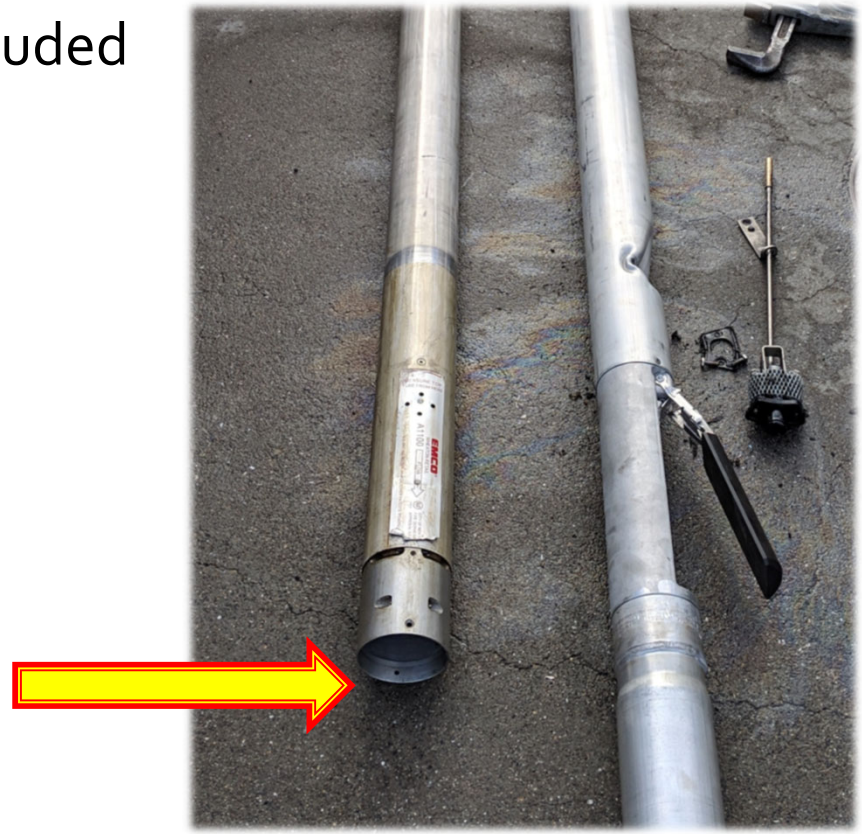
- Where's the float?

Things Nik Has Seen

- "Stuck-up" floats

Things Nik Has Seen

- Lower tube not included with purchase?



Things Nik Has Seen

- Will the flapper valve work installed upside down? (No, it will not work.)

Things Nik Has Seen

- Corrosion – how bad it can be….

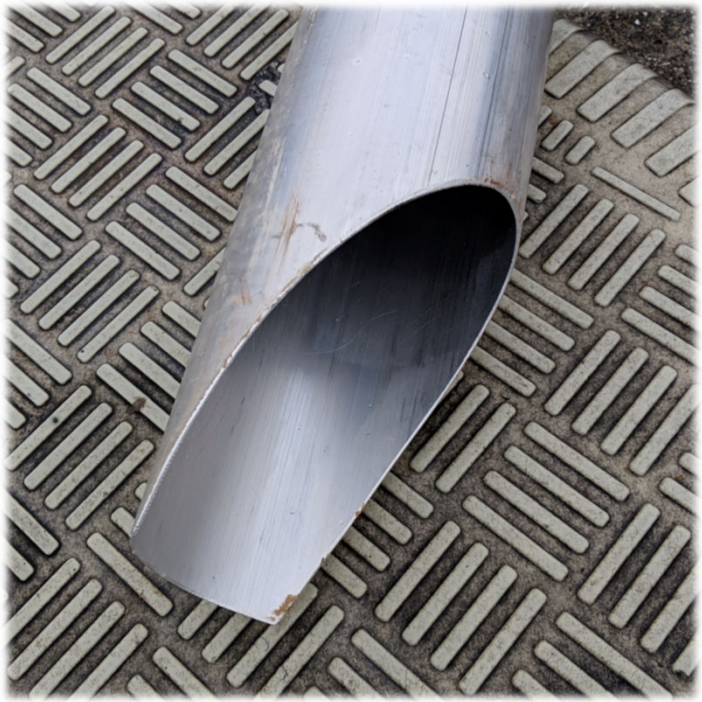
Things Nik Has Seen

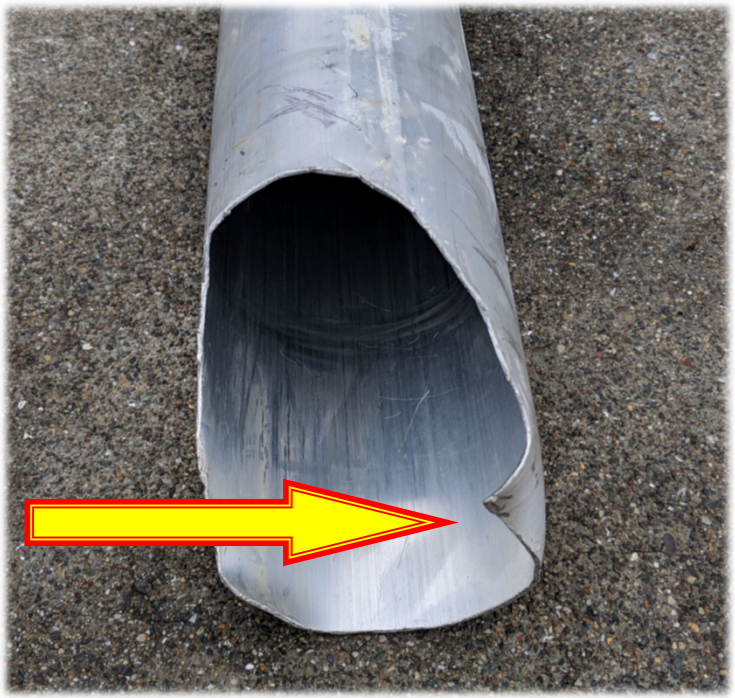
- Corrosion – how bad it can be….

Things Nik Has Seen

Things Nik Has Seen

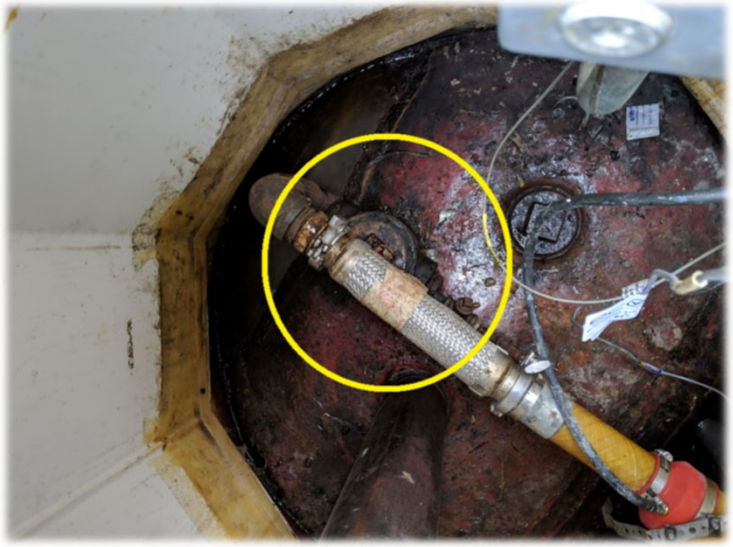
- Is this the proper 45 degree cut?
- Was this at the bottom of the tank?





Things Nik Has Seen

- Searching for ball floats

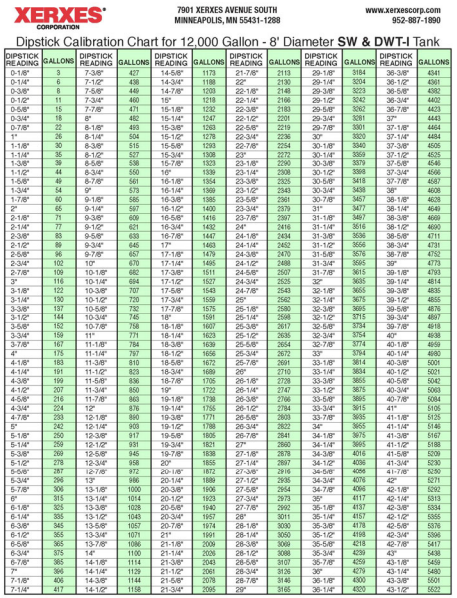


Things Nik Has Seen

- Float, what float?

TANK CHARTS

- Very important to use the correct chart

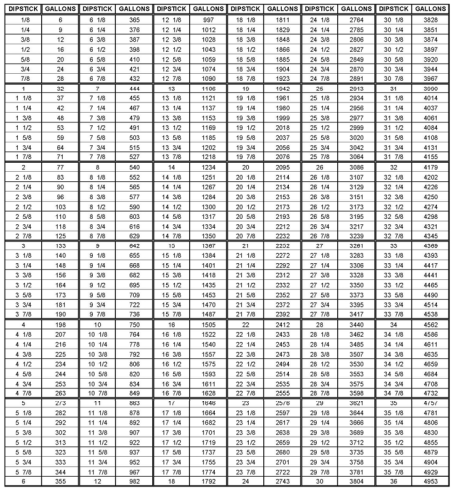


XERXES CORPORATION
7901 XERXES AVENUE SOUTH
MINNEAPOLIS, MN 55431-1288
www.xerxescorp.com
952-887-1890

Dipstick Calibration Chart for 12,000 Gallon - 8' Diameter **SW & DWT-I** Tank

DIPSTICK READING	GALLONS	DIPSTICK READING	GALLONS	DIPSTICK READING	GALLONS	DIPSTICK READING	GALLONS	DIPSTICK READING	GALLONS	DIPSTICK READING	GALLONS
0-1/8"	3	7-3/8"	427	14-5/8"	1173	21-7/8"	2113	29-1/8"	3184	36-3/8"	4541
0-1/4"	6	7-1/2"	438	14-3/4"	1188	22"	2130	29-1/4"	3204	36-1/2"	4561
0-3/8"	8	7-5/8"	449	14-7/8"	1203	22-1/8"	2148	29-3/8"	3223	36-5/8"	4582
0-1/2"	11	7-3/4"	460	15"	1218	22-1/4"	2166	29-1/2"	3242	36-3/4"	4602
0-5/8"	15	7-7/8"	471	15-1/8"	1232	22-3/8"	2183	29-5/8"	3262	36-7/8"	4623
0-3/4"	18	8"	482	15-1/4"	1247	22-1/2"	2201	29-3/4"	3281	37"	4643
0-7/8"	22	8-1/8"	493	15-3/8"	1263	22-5/8"	2219	29-7/8"	3301	37-1/8"	4664
1"	26	8-1/4"	504	15-1/2"	1278	22-3/4"	2236	30"	3320	37-1/4"	4684
1-1/8"	30	8-3/8"	515	15-5/8"	1293	22-7/8"	2254	30-1/8"	3340	37-3/8"	4705
1-1/4"	35	8-1/2"	527	15-3/4"	1308	23"	2272	30-1/4"	3359	37-1/2"	4525
1-3/8"	39	8-5/8"	538	15-7/8"	1323	23-1/8"	2290	30-3/8"	3379	37-5/8"	4546
1-1/2"	44	8-3/4"	550	16"	1339	23-1/4"	2308	30-1/2"	3398	37-3/4"	4566
1-5/8"	49	8-7/8"	561	16-1/8"	1354	23-3/8"	2325	30-5/8"	3418	37-7/8"	4587
1-3/4"	54	9"	573	16-1/4"	1369	23-1/2"	2343	30-3/4"	3438	38"	4608
1-7/8"	60	9-1/8"	585	16-3/8"	1385	23-5/8"	2361	30-7/8"	3457	38-1/8"	4628
2"	65	9-1/4"	597	16-1/2"	1400	23-3/4"	2379	31"	3477	38-1/4"	4649
2-1/8"	71	9-3/8"	609	16-5/8"	1416	23-7/8"	2397	31-1/8"	3497	38-3/8"	4669
2-1/4"	77	9-1/2"	621	16-3/4"	1432	24"	2416	31-1/4"	3516	38-1/2"	4690
2-3/8"	83	9-5/8"	633	16-7/8"	1447	24-1/8"	2434	31-3/8"	3536	38-5/8"	4711
2-1/2"	89	9-3/4"	645	17"	1463	24-1/4"	2452	31-1/2"	3556	38-3/4"	4731
2-5/8"	96	9-7/8"	657	17-1/8"	1479	24-3/8"	2470	31-5/8"	3576	38-7/8"	4752
2-3/4"	102	10"	670	17-1/4"	1495	24-1/2"	2488	31-3/4"	3595	39"	4773
2-7/8"	109	10-1/8"	682	17-3/8"	1511	24-5/8"	2507	31-7/8"	3615	39-1/8"	4793
3"	116	10-1/4"	694	17-1/2"	1527	24-3/4"	2525	32"	3635	39-1/4"	4814
3-1/8"	122	10-3/8"	707	17-5/8"	1543	24-7/8"	2543	32-1/8"	3655	39-3/8"	4835
3-1/4"	130	10-1/2"	720	17-3/4"	1559	25"	2562	32-1/4"	3675	39-1/2"	4855
3-3/8"	137	10-5/8"	732	17-7/8"	1575	25-1/8"	2580	32-3/8"	3695	39-5/8"	4876
3-1/2"	144	10-3/4"	745	18"	1591	25-1/4"	2598	32-1/2"	3715	39-3/4"	4897
3-5/8"	152	10-7/8"	758	18-1/8"	1607	25-3/8"	2617	32-5/8"	3734	39-7/8"	4918
3-3/4"	159	11"	771	18-1/4"	1623	25-1/2"	2635	32-3/4"	3754	40"	4938
3-7/8"	167	11-1/8"	784	18-3/8"	1639	25-5/8"	2654	32-7/8"	3774	40-1/8"	4959
4"	175	11-1/4"	797	18-1/2"	1656	25-3/4"	2672	33"	3794	40-1/4"	4980
4-1/8"	183	11-3/8"	810	18-5/8"	1672	25-7/8"	2691	33-1/8"	3814	40-3/8"	5001
4-1/4"	191	11-1/2"	823	18-3/4"	1689	26"	2710	33-1/4"	3834	40-1/2"	5021
4-3/8"	199	11-5/8"	836	18-7/8"	1705	26-1/8"	2728	33-3/8"	3855	40-5/8"	5043
4-1/2"	207	11-3/4"	850	19"	1722	26-1/4"	2747	33-1/2"	3875	40-3/4"	5063
4-5/8"	216	11-7/8"	863	19-1/8"	1738	26-3/8"	2766	33-5/8"	3895	40-7/8"	5084
4-3/4"	224	12"	876	19-1/4"	1755	26-1/2"	2784	33-3/4"	3915	41"	5105
4-7/8"	233	12-1/8"	890	19-3/8"	1771	26-5/8"	2803	33-7/8"	3935	41-1/8"	5125
5"	242	12-1/4"	903	19-1/2"	1788	26-3/4"	2822	34"	3955	41-1/4"	5146
5-1/8"	250	12-3/8"	917	19-5/8"	1805	26-7/8"	2841	34-1/8"	3975	41-3/8"	5167
5-1/4"	259	12-1/2"	931	19-3/4"	1821	27"	2860	34-1/4"	3995	41-1/2"	5188
5-3/8"	269	12-5/8"	945	19-7/8"	1838	27-1/8"	2878	34-3/8"	4016	41-5/8"	5209
5-1/2"	278	12-3/4"	958	20"	1855	27-1/4"	2897	34-1/2"	4036	41-3/4"	5230
5-5/8"	287	12-7/8"	972	20-1/8"	1872	27-3/8"	2916	34-5/8"	4056	41-7/8"	5250
5-3/4"	296	13"	986	20-1/4"	1889	27-1/2"	2935	34-3/4"	4076	42"	5271
5-7/8"	306	13-1/8"	1000	20-3/8"	1906	27-5/8"	2954	34-7/8"	4096	42-1/8"	5292
6"	315	13-1/4"	1014	20-1/2"	1923	27-3/4"	2973	35"	4117	42-1/4"	5313
6-1/8"	325	13-3/8"	1028	20-5/8"	1940	27-7/8"	2992	35-1/8"	4137	42-3/8"	5334
6-1/4"	335	13-1/2"	1043	20-3/4"	1957	28"	3011	35-1/4"	4157	42-1/2"	5355
6-3/8"	345	13-5/8"	1057	20-7/8"	1974	28-1/8"	3030	35-3/8"	4178	42-5/8"	5376
6-1/2"	355	13-3/4"	1071	21"	1991	28-1/4"	3050	35-1/2"	4198	42-3/4"	5396
6-5/8"	365	13-7/8"	1086	21-1/8"	2009	28-3/8"	3069	35-5/8"	4218	42-7/8"	5417
6-3/4"	375	14"	1100	21-1/4"	2026	28-1/2"	3088	35-3/4"	4239	43"	5438
6-7/8"	385	14-1/8"	1114	21-3/8"	2043	28-5/8"	3107	35-7/8"	4259	43-1/8"	5459
7"	396	14-1/4"	1129	21-1/2"	2061	28-3/4"	3126	36"	4279	43-1/4"	5480
7-1/8"	406	14-3/8"	1144	21-5/8"	2078	28-7/8"	3146	36-1/8"	4300	43-3/8"	5501
7-1/4"	417	14-1/2"	1158	21-3/4"	2095	29"	3165	36-1/4"	4320	43-1/2"	5522

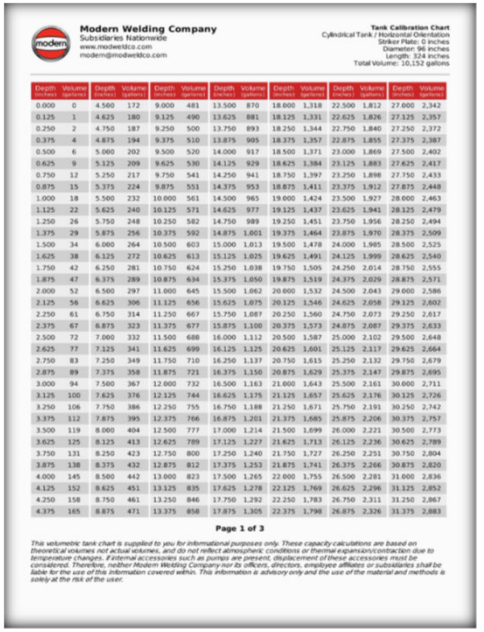
CAUTION: Do not use the Calibration Chart without reviewing Xerxes® Installation Manual and Operating Guidelines, and Xerxes® applicable Limited Warranty, copies of which are in the literature packet delivered to the site, or available at www.xerxescorp.com.



10'-20000 DWT6 Double-Wall Tank
19951 Gals

DIPSTICK	GALLONS	DIPSTICK	GALLONS	DIPSTICK	GALLONS	DIPSTICK	GALLONS	DIPSTICK	GALLONS	DIPSTICK	GALLONS
1/8	6	6 1/8	365	12 1/8	997	18 1/8	1811	24 1/8	2764	30 1/8	3828
1/4	9	6 1/4	376	12 1/4	1012	18 1/4	1829	24 1/4	2785	30 1/4	3851
3/8	12	6 3/8	387	12 3/8	1028	18 3/8	1848	24 3/8	2806	30 3/8	3874
1/2	16	6 1/2	398	12 1/2	1043	18 1/2	1866	24 1/2	2827	30 1/2	3897
5/8	20	6 5/8	410	12 5/8	1059	18 5/8	1885	24 5/8	2849	30 5/8	3920
3/4	24	6 3/4	421	12 3/4	1074	18 3/4	1904	24 3/4	2870	30 3/4	3944
7/8	28	6 7/8	432	12 7/8	1090	18 7/8	1923	24 7/8	2891	30 7/8	3967
1	32	7	444	13	1106	19	1942	25	2913	31	3990
1 1/8	37	7 1/8	455	13 1/8	1121	19 1/8	1961	25 1/8	2934	31 1/8	4014
1 1/4	42	7 1/4	467	13 1/4	1137	19 1/4	1980	25 1/4	2956	31 1/4	4037
1 3/8	48	7 3/8	479	13 3/8	1153	19 3/8	1999	25 3/8	2977	31 3/8	4061
1 1/2	53	7 1/2	491	13 1/2	1169	19 1/2	2018	25 1/2	2999	31 1/2	4084
1 5/8	59	7 5/8	503	13 5/8	1185	19 5/8	2037	25 5/8	3020	31 5/8	4108
1 3/4	64	7 3/4	515	13 3/4	1202	19 3/4	2056	25 3/4	3042	31 3/4	4131
1 7/8	71	7 7/8	527	13 7/8	1218	19 7/8	2076	25 7/8	3064	31 7/8	4155
2	77	8	540	14	1234	20	2095	26	3086	32	4179
2 1/8	83	8 1/8	552	14 1/8	1251	20 1/8	2114	26 1/8	3107	32 1/8	4202
2 1/4	90	8 1/4	565	14 1/4	1267	20 1/4	2134	26 1/4	3129	32 1/4	4226
2 3/8	96	8 3/8	577	14 3/8	1284	20 3/8	2153	26 3/8	3151	32 3/8	4250
2 1/2	103	8 1/2	590	14 1/2	1300	20 1/2	2173	26 1/2	3173	32 1/2	4274
2 5/8	110	8 5/8	603	14 5/8	1317	20 5/8	2193	26 5/8	3195	32 5/8	4298
2 3/4	118	8 3/4	616	14 3/4	1334	20 3/4	2212	26 3/4	3217	32 3/4	4321
2 7/8	125	8 7/8	629	14 7/8	1350	20 7/8	2232	26 7/8	3239	32 7/8	4345
3	133	9	642	15	1367	21	2252	27	3261	33	4369
3 1/8	140	9 1/8	655	15 1/8	1384	21 1/8	2272	27 1/8	3283	33 1/8	4393
3 1/4	148	9 1/4	668	15 1/4	1401	21 1/4	2292	27 1/4	3306	33 1/4	4417
3 3/8	156	9 3/8	682	15 3/8	1418	21 3/8	2312	27 3/8	3328	33 3/8	4441
3 1/2	164	9 1/2	695	15 1/2	1435	21 1/2	2332	27 1/2	3350	33 1/2	4465
3 5/8	173	9 5/8	709	15 5/8	1453	21 5/8	2352	27 5/8	3373	33 5/8	4490
3 3/4	181	9 3/4	722	15 3/4	1470	21 3/4	2372	27 3/4	3395	33 3/4	4514
3 7/8	190	9 7/8	736	15 7/8	1487	21 7/8	2392	27 7/8	3417	33 7/8	4538
4	198	10	750	16	1505	22	2412	28	3440	34	4562
4 1/8	207	10 1/8	764	16 1/8	1522	22 1/8	2433	28 1/8	3462	34 1/8	4586
4 1/4	216	10 1/4	778	16 1/4	1540	22 1/4	2453	28 1/4	3485	34 1/4	4611
4 3/8	225	10 3/8	792	16 3/8	1557	22 3/8	2473	28 3/8	3507	34 3/8	4635
4 1/2	234	10 1/2	806	16 1/2	1575	22 1/2	2494	28 1/2	3530	34 1/2	4659
4 5/8	244	10 5/8	820	16 5/8	1593	22 5/8	2514	28 5/8	3553	34 5/8	4684
4 3/4	253	10 3/4	834	16 3/4	1611	22 3/4	2535	28 3/4	3575	34 3/4	4708
4 7/8	263	10 7/8	849	16 7/8	1628	22 7/8	2555	28 7/8	3598	34 7/8	4732
5	2/3	11	863	17	1646	23	25/8	29	3621	35	4757
5 1/8	282	11 1/8	878	17 1/8	1664	23 1/8	2597	29 1/8	3644	35 1/8	4781
5 1/4	292	11 1/4	892	17 1/4	1682	23 1/4	2617	29 1/4	3666	35 1/4	4806
5 3/8	302	11 3/8	907	17 3/8	1701	23 3/8	2638	29 3/8	3689	35 3/8	4830
5 1/2	313	11 1/2	922	17 1/2	1719	23 1/2	2659	29 1/2	3712	35 1/2	4855
5 5/8	323	11 5/8	937	17 5/8	1737	23 5/8	2680	29 5/8	3735	35 5/8	4879
5 3/4	333	11 3/4	952	17 3/4	1755	23 3/4	2701	29 3/4	3758	35 3/4	4904
5 7/8	344	11 7/8	967	17 7/8	1774	23 7/8	2722	29 7/8	3781	35 7/8	4929
6	355	12	982	18	1792	24	2743	30	3804	36	4953

Containment Solutions, Inc. 1



Modern Welding Company
Subsidiaries Nationwide
www.modweldco.com
modern@modweldco.com

Tank Calibration Chart
Cylindrical Tank / Horizontal Orientation
Striker Plate: 0 inches
Diameter: 96 inches
Length: 324 inches
Total Volume: 10,152 gallons

Depth (inches)	Volume (gallons)	Depth (inches)	Volume (gallons)	Depth (inches)	Volume (gallons)	Depth (inches)	Volume (gallons)	Depth (inches)	Volume (gallons)	Depth (inches)	Volume (gallons)
0.000	0	4.500	172	9.000	481	13.500	870	18.000	1,318	22.500	1,812	27.000	2,342
0.125	1	4.625	180	9.125	490	13.625	881	18.125	1,331	22.625	1,826	27.125	2,357
0.250	2	4.750	187	9.250	500	13.750	893	18.250	1,344	22.750	1,840	27.250	2,372
0.375	4	4.875	194	9.375	510	13.875	905	18.375	1,357	22.875	1,855	27.375	2,387
0.500	6	5.000	202	9.500	520	14.000	917	18.500	1,371	23.000	1,869	27.500	2,402
0.625	9	5.125	209	9.625	530	14.125	929	18.625	1,384	23.125	1,883	27.625	2,417
0.750	12	5.250	217	9.750	541	14.250	941	18.750	1,397	23.250	1,898	27.750	2,433
0.875	15	5.375	224	9.875	551	14.375	953	18.875	1,411	23.375	1,912	27.875	2,448
1.000	18	5.500	232	10.000	561	14.500	965	19.000	1,424	23.500	1,927	28.000	2,463
1.125	22	5.625	240	10.125	571	14.625	977	19.125	1,437	23.625	1,941	28.125	2,479
1.250	26	5.750	248	10.250	582	14.750	989	19.250	1,451	23.750	1,956	28.250	2,494
1.375	29	5.875	256	10.375	592	14.875	1,001	19.375	1,464	23.875	1,970	28.375	2,509
1.500	34	6.000	264	10.500	603	15.000	1,013	19.500	1,478	24.000	1,985	28.500	2,525
1.625	38	6.125	272	10.625	613	15.125	1,025	19.625	1,491	24.125	1,999	28.625	2,540
1.750	42	6.250	281	10.750	624	15.250	1,038	19.750	1,505	24.250	2,014	28.750	2,555
1.875	47	6.375	289	10.875	634	15.375	1,050	19.875	1,519	24.375	2,029	28.875	2,571
2.000	52	6.500	297	11.000	645	15.500	1,062	20.000	1,532	24.500	2,043	29.000	2,586
2.125	56	6.625	306	11.125	656	15.625	1,075	20.125	1,546	24.625	2,058	29.125	2,602
2.250	61	6.750	314	11.250	667	15.750	1,087	20.250	1,560	24.750	2,073	29.250	2,617
2.375	67	6.875	323	11.375	677	15.875	1,100	20.375	1,573	24.875	2,087	29.375	2,633
2.500	72	7.000	332	11.500	688	16.000	1,112	20.500	1,587	25.000	2,102	29.500	2,648
2.625	77	7.125	341	11.625	699	16.125	1,125	20.625	1,601	25.125	2,117	29.625	2,664
2.750	83	7.250	349	11.750	710	16.250	1,137	20.750	1,615	25.250	2,132	29.750	2,679
2.875	89	7.375	358	11.875	721	16.375	1,150	20.875	1,629	25.375	2,147	29.875	2,695
3.000	94	7.500	367	12.000	732	16.500	1,163	21.000	1,643	25.500	2,161	30.000	2,711
3.125	100	7.625	376	12.125	744	16.625	1,175	21.125	1,657	25.625	2,176	30.125	2,726
3.250	106	7.750	386	12.250	755	16.750	1,188	21.250	1,671	25.750	2,191	30.250	2,742
3.375	112	7.875	395	12.375	766	16.875	1,201	21.375	1,685	25.875	2,206	30.375	2,757
3.500	119	8.000	404	12.500	777	17.000	1,214	21.500	1,699	26.000	2,221	30.500	2,773
3.625	125	8.125	413	12.625	789	17.125	1,227	21.625	1,713	26.125	2,236	30.625	2,789
3.750	131	8.250	423	12.750	800	17.250	1,240	21.750	1,727	26.250	2,251	30.750	2,804
3.875	138	8.375	432	12.875	812	17.375	1,253	21.875	1,741	26.375	2,266	30.875	2,820
4.000	145	8.500	442	13.000	823	17.500	1,265	22.000	1,755	26.500	2,281	31.000	2,836
4.125	152	8.625	451	13.125	835	17.625	1,278	22.125	1,769	26.625	2,296	31.125	2,852
4.250	158	8.750	461	13.250	846	17.750	1,292	22.250	1,783	26.750	2,311	31.250	2,867
4.375	165	8.875	471	13.375	858	17.875	1,305	22.375	1,798	26.875	2,326	31.375	2,883

Page 1 of 3

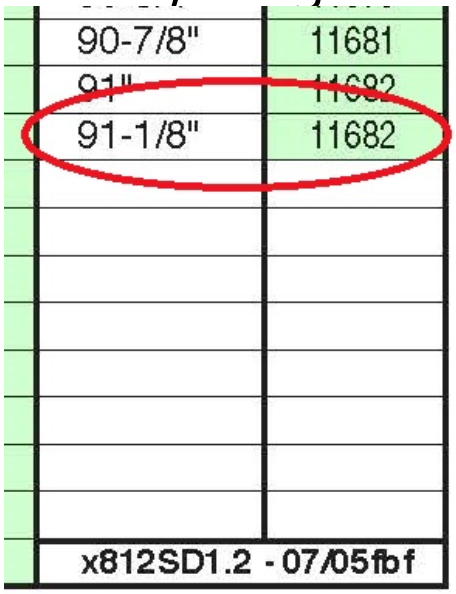
This volumetric tank chart is supplied to you for informational purposes only. These capacity calculations are based on theoretical volumes not actual volumes, and do not reflect atmospheric conditions or thermal expansion/contraction due to temperature changes. If internal accessories such as pumps are present, displacement of these accessories must be considered. Therefore, neither Modern Welding Company nor its officers, directors, employee affiliates or subsidiaries shall be liable for the use of this information covered within. This information is advisory only and the use of the material and methods is solely at the risk of the user.

TANK CHARTS

- Very important to use the correct chart
  - Need to take all measurements to nearest 1/8”
  - If a calculated level falls between two entries on the chart, always use the smaller gallon amount/height
  - Tank deflection will cause measured diameters to differ from tank chart values
  - For compartmented fiberglass tanks, you must use the proper charts for Base Tanks and End Tanks
  - Calibration charts for many tanks made by Owens-Corning, Joor, Trusco, and other out-of-business manufacturers are available at www.Unidocs.org.

TANK CHARTS

- 100% Capacity = Last entry on chart
  - Example: 100% = 11,682 gallons = 91.125" product height



90-7/8"	11681
91"	11682
91-1/8"	11682
x812SD1.2 - 07/05fbf	

1/8 = 0.125
1/4 = 0.25
3/8 = 0.375
1/2 = 0.50
5/8 = 0.625
3/4 = 0.75
7/8 = 0.875

TANK CHARTS

- 95% Capacity = Last entry on chart x 0.95
  - Example: 95% = 11,682 x 0.95 ≈ 11,098 gallons ≈ 81.625" product height

81-1/2"	11079
81-5/8"	11091
81-3/4"	11103
81-7/8"	11114

TANK CHARTS

- 90% Capacity = Last entry on chart x 0.90
  - Example: 90% = 11,682 x 0.90 ≈ 10,514 gallons ≈ 76.125" product height

DIPSTICK READING	GALLONS
76-1/8"	10501
76-1/4"	10516
76-3/8"	10531

COMPARING TANK CHARTS

	Containment Solutions	Modern Welding	Owens-Corning	Xerxes
Model	12,000 gallon 8' Diameter DWT6 Tank	12,000 gallon 8'0" x 32"0"	12,000 gallon 8' G5, G6, DWT-2(8) & DWT-3(8)	12,000 gallon 8' Diameter DW Tank manufactured after 8/31/2008
100% Diameter	91.625	95.750	92.000	90.500
100% Capacity	11,595	12,032	11,627	11,608
95% Volume	11,015.25	11,430.75	11,045.65	11,027.60
Product Height @ 95%	82.375	86.375	82.625	81.375
90% Volume	10,435.50	10,829.13	10,464.30	10,447.20
Product Height @ 90%	76.875	80.625	77.000	75.875

COMPARING TANK CHARTS

	Xerxes	Xerxes	Xerxes	Xerxes	Xerxes
Model	8,000 gallon 8' Diameter DW Tank manufactured after 8/31/2008	8,000 gallon 8' Diameter DW End Tank manufactured after 8/31/2008	8,000 gallon 8' Diameter DWT-II Tank manufactured before 9/1/2008	8,000 gallon 8' Diameter DWT-II End Tank manufactured before 9/1/2008	8,000 gallon 8' Diameter Model SW & DWT-I Tanks
100% Diameter	90.500	90.500	89.750	90.250	91.125
100% Capacity	7,899	8,001	7,841	7,917	7,950
95% Volume	7,504.05	7,600.95	7,448.95	7,521.15	7,552.50
Product Height @ 95%	81.125	81.750	80.250	81.375	81.375
90% Volume	7,109.10	7,200.90	7,056.90	7,125.30	7,155.00
Product Height @ 90%	75.625	76.375	74.750	76.000	75.875

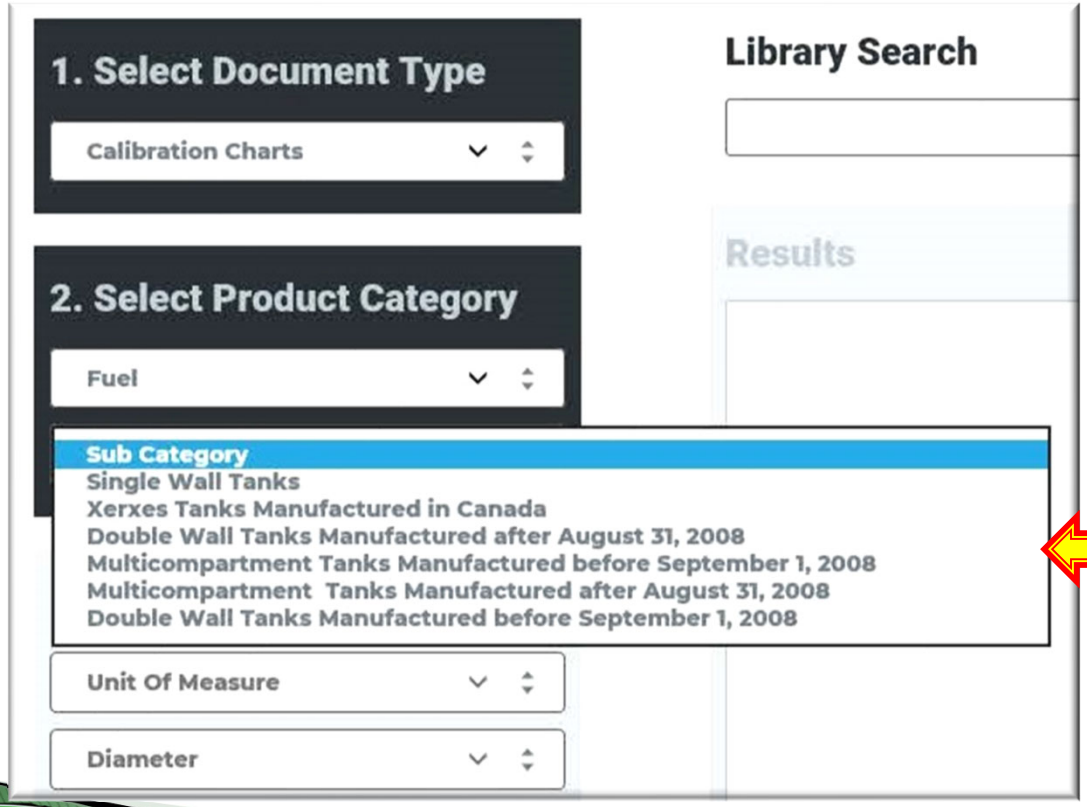
TANK CHARTS – Xerxes

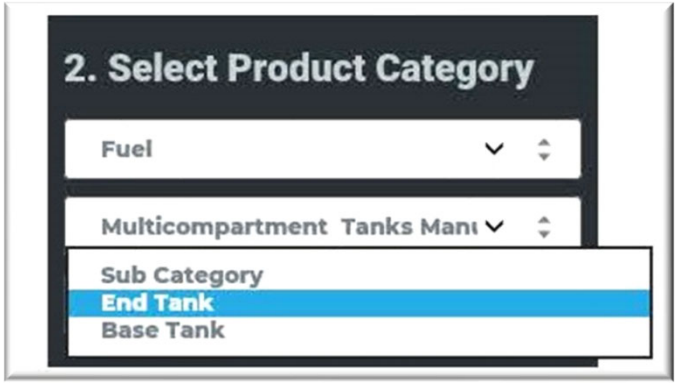
www.zcl.com/en/document-library/

- Fiberglass tanks
- Xerxes has different charts for tanks manufactured before 9/1/2008 and tanks manufactured after 8/31/2008
- Older double-wall tank (Model DWT-I) data is on same charts as Single Wall Tanks
- Xerxes charts cannot be used for tanks made by other manufacturers (e.g., Owens-Corning or Containment Solutions)

TANK CHARTS – Xerxes

www.zcl.com/en/document-library/





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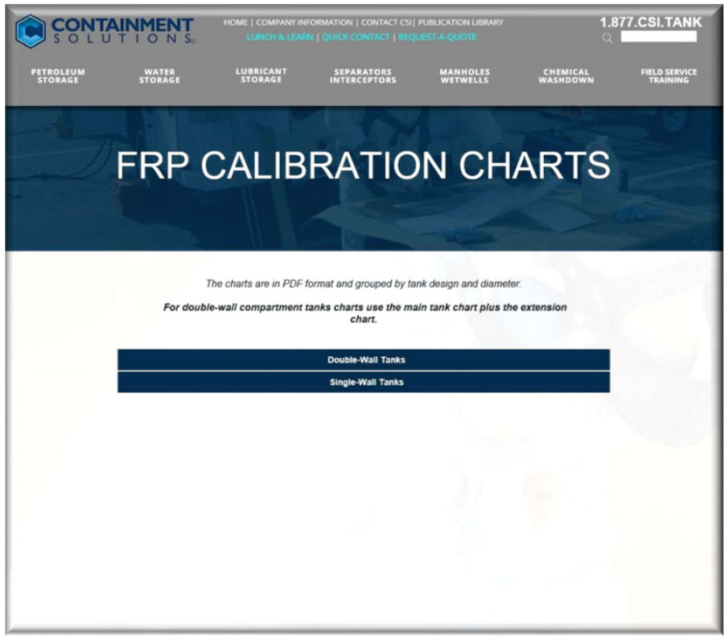
Main Category = Fuel
Sub Category: Select from menu
Sub Category = End or Base Tank
Unit of Measure = Feet
Diameter: Select from menu
Unit of measure = US Gallons

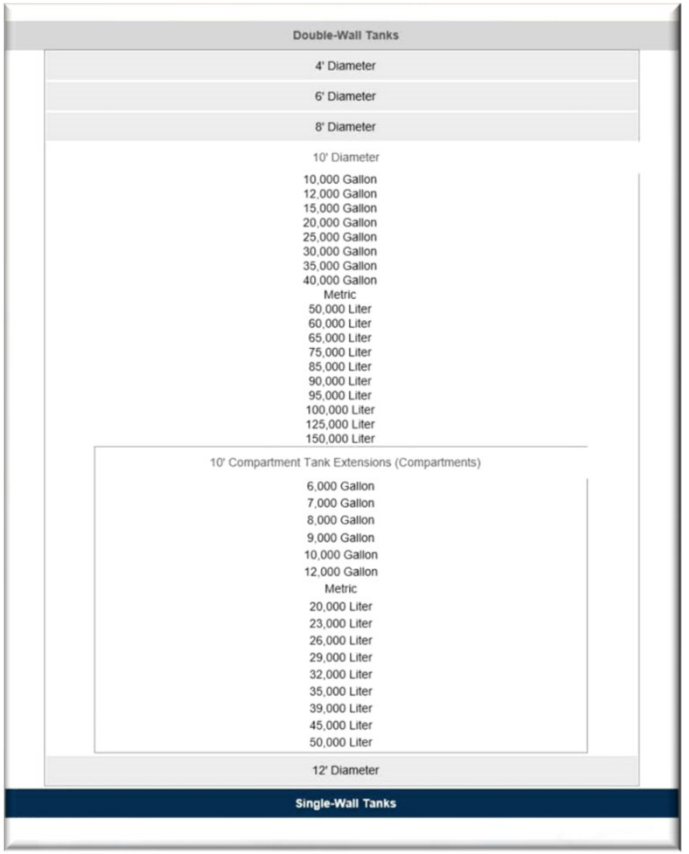
TANK CHARTS – Containment Solutions, Inc.

http://containmentsolutions.com/fiberglass-calibration-charts.html



- Fiberglass tanks

DW Tanks or SW Tanks
Diameter
Volume



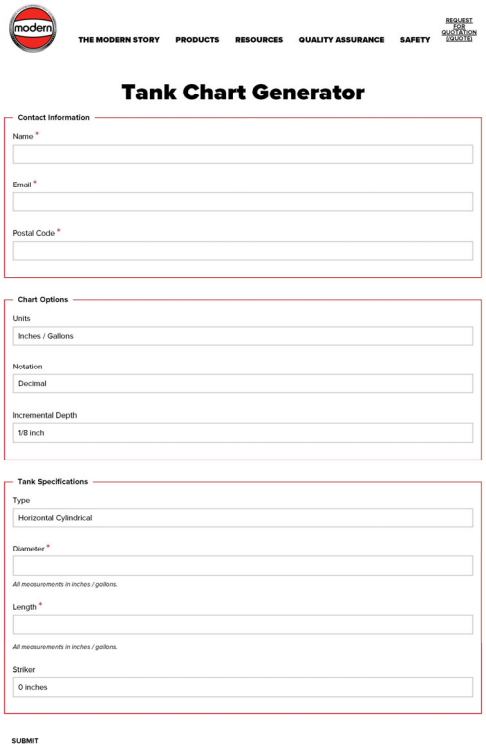
TANK CHARTS – Owens-Corning

http://www.unidocs.org/hazmat/ust/installation/tankcharts.html

- Many Owens-Corning charts are available on the Unidocs website. If an O-C tank chart cannot be found, Containment Solutions charts are the best substitute, but not an exact match *(CSI tanks have hemispherical ends, O-C tank ends are less rounded)*

TANK CHARTS – Modern Welding

www.modweldco.com/resources/tank-chart-generator



- Steel tanks

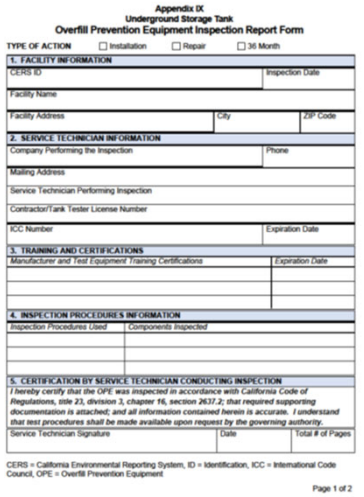
Website generates calibration charts based on tank dimensions

Charts are sent by email

Note: Guesstimates for gallon capacity and tank length lead to garbage in, garbage out data, so it is always better to use original tank charts if possible

INSPECTION RECORDS

- Overfill Prevention Equipment Inspection Report Form
- Attachments (Per 23 CCR Appendix IX, "I hereby certify that… required supporting documentation is attached.")
  - Tank chart(s)
  - Measurements
  - Calculations
  - In-Tank Setup *[if using automatic tank gauge (ATG) to trigger alarms per 23 CCR §2635(c)(1)(A) or (B)]*



Appendix IX
Underground Storage Tank
Overfill Prevention Equipment Inspection Report Form

TYPE OF ACTION ☐ Installation ☐ Repair ☐ 36 Month

1. FACILITY INFORMATION
CERS ID | Inspection Date
Facility Name
Facility Address | City | ZIP Code

2. SERVICE TECHNICIAN INFORMATION
Company Performing the Inspection | Phone
Mailing Address
Service Technician Performing Inspection
Contractor/Tank Tester License Number
ICC Number | Expiration Date

3. TRAINING AND CERTIFICATIONS
Manufacturer and Test Equipment Training Certifications | Expiration Date

4. INSPECTION PROCEDURES INFORMATION
Inspection Procedures Used | Components Inspected

5. CERTIFICATION BY SERVICE TECHNICIAN CONDUCTING INSPECTION
I hereby certify that the OPE was inspected in accordance with California Code of Regulations, title 23, division 3, chapter 16, section 2637.2; that required supporting documentation is attached; and all information contained herein is accurate. I understand that test procedures shall be made available upon request by the governing authority.
Service Technician Signature | Date | Total # of Pages

CERS = California Environmental Reporting System, ID = Identification, ICC = International Code Council, OPE = Overfill Prevention Equipment

Page 1 of 2

ALLOWED OVERFILL PREVENTION METHODS

Tank Install Date	Option A1 OK?	Option A2 OK?	Option B OK?	Option C OK?	Option D OK?
7/1/2003 - Present	➢ Yes if BF installed prior to 10/1/2018 ➢ No if BF installed on or after 10/1/2018	➢ Yes	➢ Yes if BF installed prior to 10/1/2018 ➢ No if BF installed on or after 10/1/2018	➢ Yes	➢ Yes
7/2/1987 – 6/30/2003	➢ Yes if UST has monitored fill sump and DW U/G Vent Line and BF installed prior to 10/1/2018 ➢ No if direct-bury spill bucket ➢ No if unmonitored fill sump ➢ No if SW or unmonitored U/G Vent Line ➢ No if BF installed on or after 10/1/2018	➢ Yes if UST has monitored fill sump and DW U/G Vent Line ➢ No if direct-bury spill bucket ➢ No if unmonitored fill sump ➢ No if SW or unmonitored U/G Vent Line	➢ Yes if BF installed prior to 10/1/2018 ➢ No if BF installed on or after 10/1/2018	➢ Yes	➢ Yes if UST has monitored fill sump and DW U/G Vent Line ➢ No if direct-bury spill bucket ➢ No if unmonitored fill sump ➢ No if SW or unmonitored U/G Vent Line
On or before 7/1/1987	➢ Yes if BF installed prior to 10/1/2018 ➢ No if BF installed on or after 10/1/2018	➢ Yes	➢ Yes if BF installed prior to 10/1/2018 ➢ No if BF installed on or after 10/1/2018	➢ Yes	➢ Yes

BF = Ball float, DW = Double-wall, SW = Single-wall; U/G = Underground

VIOLATIONS

- Unified Program Violation Type 2030036 Overfill Prevention
  - Failure of…
    - …equipment to function [23 CCR §2635(c)(1)]
    - …equipment to activate at correct level [23 CCR §2635(c)(1)]
  - Failure to…
    - …meet exemption criteria [23 CCR §2635(c)(2)]
    - …install overfill prevention equipment [23 CCR §2635(c)(1) or 2665(a)]
    - …inspect by 10/13/2018 and every 36 months [23 CCR §2637.2(a)]
    - …inspect within 30 days of installation or repair [23 CCR §2637.2(a)]
    - …properly inspect [23 CCR §2637.2(b)]
    - …have qualified technician perform the inspection [23 CCR §2637.2(c)]
    - …maintain inspection records for 36 months [23 CCR §2712(b)(1)(G)]
  - Ball float for OP installed after 10/1/2018 [23 CCR §2635(d) & 2665(c)]

VIOLATIONS

- UP Violation Type 2010018 Overfill Prevention Inspection – Records
  - Failure to…
    - …document inspection on Overfill Prevention Equipment Inspection Report Form [23 CCR §2637.2(d)]
    - …include attachments with Overfill Prevention Equipment Inspection Report Form [23 CCR §2637.2(d) & Appendix IX]
    - …submit OPEIR Form and attachments to the UPA within 30 days of inspection [23 CCR §2637.2(e)]

VIOLATIONS

- UP Violation Type 20300047 Secondary Containment
  - Providing overfill prevention per 23 CCR §2635(c)(1)(A) or (D) for a UST installed between 7/2/1987 and 6/30/2003 that has a direct-buried fill riser or single-wall underground vent line

[Note: Violation is due to failure to qualify for exemption of the riser and vent piping from secondary containment per 23 CCR §2636(a)(1), not a failure to provide overfill prevention.]

Overfill Prevention Equipment

Images obtained from, but not limited to:

- California Environmental Reporting System (CERS)
- Emco-Wheaton Retail Corp.
- Franklin Fueling Systems
- Morrison Bros. Co.
- OPW
- Petroleum Equipment Institute (PEI)
- US EPA
- Veeder-Root

Any Questions?