State of California
AIR RESOURCES BOARD

EXECUTIVE ORDER VR-401-E

Related to Certification of Vapor Recovery Systems

OPW Phase I Enhanced Vapor Recovery (EVR) System For Aboveground Storage Tanks (AST)

WHEREAS, the California Air Resources Board (ARB) has established, pursuant to California Health and Safety Code sections 39600, 39601 and 41954, certification procedures for systems designed for the control of gasoline vapor emissions during the filling of ASTs, in its Certification Procedure for Vapor Recovery Systems at Gasoline Dispensing Facilities Using Aboveground Storage Tanks (CP-206) as last amended on May 27, 2014, and incorporated by reference in Title 17, California Code of Regulations, Section 94016;

WHEREAS, OPW Fueling Components, Inc. (OPW) requested and was granted certification of the OPW Phase I EVR System for ASTs pursuant to CP-206 by Executive Order VR-401-A, first issued on February 3, 2010, modified in Revisions B and C, and subsequently extended by one year on May 12, 2014, by Executive Order VR-401-D;

WHEREAS, Executive Order VR-401-D expires on July 1, 2015;

WHEREAS, CP-206 provides a process for the renewal of the certification prior to the expiration date;

WHEREAS, OPW requested renewal of the certification of the OPW Phase I EVR System for ASTs on May 24, 2013;

WHEREAS, ARB has conducted a renewal evaluation and has found no system deficiencies with the OPW Phase I EVR System for ASTs;

WHEREAS, CP-206 provides that ARB Executive Officer shall renew the Executive Order for a period of four years if no data demonstrating system deficiencies is found or developed prior to the expiration date;

WHEREAS, I, Richard W. Corey, ARB Executive Officer, find that no data demonstrating system deficiencies has been found or developed as of the date of this Executive Order;

WHEREAS all provisions, terms and conditions for certification listed in Executive Order VR-401-C and attachments are incorporated by reference herein.

NOW THEREFORE, IT IS HEREBY ORDERED that the certification granted in Executive Order VR-401-C, as incorporated by reference herein, is renewed until July 1, 2019 and shall remain in full force and effect through that date.

IT IS FURTHER ORDERED that, notwithstanding the previous paragraph, if any data demonstrating system deficiencies is documented during the renewal period then the deficiencies shall be resolved to the ARB Executive Officer's satisfaction, or this renewal shall become ineffective and the certification may be revoked.

Executed at Sacramento, California, this 29th day of June 2015.

Richard W. Corey
Executive Officer

Attachments:

Exhibit 1	Equipment List
Exhibit 2	Installation, Maintenance, and Compliance Standards and Specifications
Exhibit 3	Manufacturing Performance Standards and Specifications and Warranty
Exhibit 4	Determination of Static Pressure Performance of Vapor Recovery Systems at Gasoline Dispensing Facilities with Aboveground Storage Tanks
Exhibit 5	Alternate Phase I EVR Installation Configurations for Existing Aboveground Storage Tanks

Exhibit 1
Equipment List

Equipment	**Manufacturer/Model Number**
Emergency Vent (Figure 1A)	OPW 301W-XYYZ *W represented by:* *blank = female threads* *M = male threads* *F = #150 flange mounted* *X represented by:* *2 = 2.0" vent* *3 = 3.0" vent* *4 = 4.0" vent* *5 = 5.0" vent* *6 = 6.0" vent* *8 = 8.0" vent* *1 = 10.0" vent* *YY represented by:* *08 = 8oz/sq.in.* *16 = 16oz/sq.in.* *Z represented by:* *0 = female NPT threads* *1 = male NPT threads* *5 = #150 flange*

Note: For flange mounted models use gasket material made by Fibreflex. More information is available at http://www.fibreflex.com.

Direct Fill Spill Container Assembly With Drain Valve (Figures 1B and 1C)	OPW 33X-ASTWYZ (spill container) *X represented by:* *1 = welded bucket* *2 = seamless bucket* *Y represented by:* *3 = 3.5 gallon capacity* *5 = 5.0 gallon capacity* *7 = 7.0 gallon capacity* *Z represented by:* *4 = 4.0" NPT base* *6 = 6.0" NPT base* OPW 1DK-2100EVR (drain valve)

Equipment	**Manufacturer/Model Number**
Direct Fill Spill Container Assembly With Drain Valve - Continued (Figures 1B and 1C)	*OPW 53-00XX (double tapped bushing) XX represented by: 36 = 4.0”x2.0”x2.0” 38 = 4.0”x3.0”x3.0” 62 = 6.0”x2.0”x2.0” 63 = 6.0”x3.0”x3.0” *Note: OPW 53-00XX double tapped bushings are typically used for remote fill configurations. However, if a Kamvalock NPT style (model numbers ending in 0200, 0300) product adaptor is selected, such bushing will be required for the spill container assembly. Kamvalok dual style fittings (model numbers ending in 2040 and 3060) do not require the use of the 53-00XX double tapped bushing.
Overfill Prevention Device with Drop Tube (Figure 1D and 1E)	OPW 61fSTOP-XXXXT (overfill device) *XXXX represented by:* *1000 = 2.0” vertical float* *2000 = 2.0” swing style float* *3050 = 3.0” vertical style float* OPW 61FT-DDLL (drop tube) *DD represented by:* *02 = 2.0” drop tube* *03 = 3.0” drop tube* LL= length in feet OPW 53-00XX (double tapped bushing) *XX represented by:* *36 = 4.0”x2.0”x2.0”* *38 = 4.0”x3.0”x3.0”* *62 = 6.0”x2.0”x2.0”* *63 = 6.0”x3.0”x3.0”*

Equipment	**Manufacturer/Model Number**
Kamvalok Non-Rotatable Product Adaptor (Figure 1F)	OPW 161BAN-YYYY** *B represented by:* *1 = Buna seal* *2 = Viton seal* *YYYY represented by:* *0150 = 1.5" NPT* *0200 = 2.0" NPT* *0300 = 3.0" NPT* *2040 = dual 2.0"X4.0" NPT** *3060 = dual 3.0"X6.0" NPT** **Note: Dual fittings are recommended when using a direct fill spill container.* **Cast model number will include four digits such as "1611", while the rolled stamped model number will include four digits and two characters such as, "1611-AN" or "1612-AN". See Figure 1F for further explanation.
Product Adaptor Dust Caps (Figures 1G and 1H)	OPW 634B-0XXX *XXX represented by:* *150 = 2.0"* *160 = 2.5"* *180 = 4.0"* OPW 634BK-0XXX (optional locking cap) *XXX represented by:* *090 = 2.0"* *100 = 3.0"* *200 = 4.0"*

Equipment	Manufacturer/Model Number
Kamvalok Product Coupler (Figure 1I)	OPW 1711DL-YYYY or 1712DL-YYYY (viton seal) *L = locking coupler and blank for non-locking coupler* *YYYY represented by:* *1085 = 1.5”* *1090 = 2.0”* *1095 = 3.0”*

Note: During fuel deliveries, an OPW Kamvalok coupler (part numbers 1711D, 1711DL, 1712D, and 1712DL) shall be used with an OPW Kamvalok product adaptor (part numbers OPW 1612AN). The Kamvalok coupler shall provided by the fuel supplier or provided by the GDF operator.

Kamvalok Product Adaptor, Dust Cap, and Kamvalok Product Coupler Combinations

Kamvalok Product Adaptor	Product Adaptor Dust Cap	Kamvalok Product Coupler
1611AN-0150 or 1612AN-0150	634B-0150 or 634BK-0090	1711DL-1085, 1712DL-1085, 1711D-1085 or 1712D-1085
1611AN-0200, 1612AN-0200 or 1611AN-2040	634B-160 or 634BK-0100	1711DL-1090, 1712DL-1090, 1711D-1090 or 1711D-1090
1611AN-0300, 1612AN-0300 or 1612AN-3060	634B-0180 or 634BK-0200	1711DL-1095, 1712DL-1095, 1711D-1095 or 1712D-1095

Equipment	Manufacturer/Model Number
Non-Rotatable Vapor Adaptor (Figure 1J)	OPW 1611AV-16YY *YY represented by:* *05 = 3.0” NPT* *20 = 4.0” NPT* *OPW 1611AVB-EVR* *Bronze 4” NPT*

Equipment	**Manufacturer/Model Number**
Rotatable Vapor Adaptor (Figure 1J)	*OPW 61VSA-1020-EVR* *Bronze, 4" NPT, Rotatable*
Vapor Adaptor Dust Cap (Figure 1K)	OPW 1711T-7085-EVR OPW 1711LPC-0300 *Ductile iron low profile cap*

Vapor Adaptor and Dust Cap Combinations

Non-Rotatable Vapor Adaptor	Rotatable Vapor Adaptor	Vapor Adaptor Dust Cap
1611AV-1605, 1611AV-1620 or 1611AVB-EVR	61VSA-1020-EVR	1711T-7085-EVR or 1711LPC-0300

Dedicated Gauging Port with Drop Tube Assembly (Figures 1G, 1H, 1L,1M, and 1N)	OPW 204247 (port cage) OPW 634B-0XXX (dust cap) *XXX represented by:* *140 = 1.5"* *150 = 2.0* OPW 634BK-0090 (optional 2" locking cap) OPW 633AST-0XXX (female NPT Kamlok adaptor) *XXX represented by:* *150 = 1.5"* *200 = 2.0"* OPW 53-00XX (required double tapped bushing) *XX represented by:* *12 = 2.0"x1.5"x1.5"* *02 = 3.0"x2.0"x2.0"* *34 = 4.0"x1.5"x1.5"* *36 = 4.0"x2.0"x2.0"* *62 = 6.0"x2.0"x2.0"*

Equipment	**Manufacturer/Model Number**
Mechanical Tank Gauging (optional) (Figures 1O, 1P, and 1R)	OPW 200TG-XXXYY (tank gauge) *XXX represented by:* *ENG = English units* *MET = SI units* *YY represented by:* *blank = 20' cable length* *40 = 40' cable length* OPW 61T-02LL (drop tube for use with tank gauge) *LL =length in feet* OPW TGTA-0400* (optional combo fitting) *Allows for installation of mechanical tank gauge and overfill alarm on the same bung location.
Liquid Level Overfill Alarm (optional) (Figure 1Q)	OPW X44TA-0100 *X represented by:* *1 = 1 channel* *4 = 4 channel* OPW 44TA-LLFS (liquid level float switch assembly)
Automatic Tank Gauge Port Components[1] (optional) (Figure 1S)	OPW 62M Monitoring Probe Cap and Adaptor Kit Optional component for use in conjunction with automatic tank gauging systems

[1] If these components are installed or required by regulations of other agencies, only those components and model numbers specified above shall be installed or used.

Table 1
Components Exempt from Identification Requirements

Component Name	Manufacturer	Model Number
Drain Valve	OPW	OPW 1DK-2100EVR
Tank Bung Combo Fitting	OPW	OPW TGTA-0400
Drop Tube for Overfill Prevention Device	OPW	OPW 61FT-DDLL
Pipe Fittings	OPW	OPW 53-0XX
Kamlok Female NPT Adaptors	OPW	633FAST-0XXX
Remote Spill Containers	OPW	6211R
Tank Gauge Port Adaptor	OPW	62M
Dedicated Gauging Port Cage	OPW	204247

Figure 1A
OPW 301W-XYYZ Series Emergency Vents

Figure 1A
OPW 301F-XYYZ Series Flange Mounted Emergency Vents

Note: For flange mounted models use gasket material made by Fibreflex. More information is available at http://www.fibreflex.com.

Figure 1B
OPW 33X-ASTWYZ - Direct Fill Spill Container

Figure 1C
OPW 1DK-2100EVR - Direct Fill Spill Container Drain Valve

Figure 1D
OPW 61FSTOP-XXXXT Overfill Prevention Device

Figure 1E
OPW 61FT-DDLL Drop Tube
(For use with overfill prevention device only.)

Figure 1F
OPW 161BAN-YYYY Kamvalok Non-Rotatable Product Adaptor

Figure 1G
OPW 634B-0XXX Product Dust Cap
(Also used for dedicated gauging port)

Figure 1H
OPW 634BK-0XXX Product Locking Dust Cap
(Also used for dedicated gauging port)

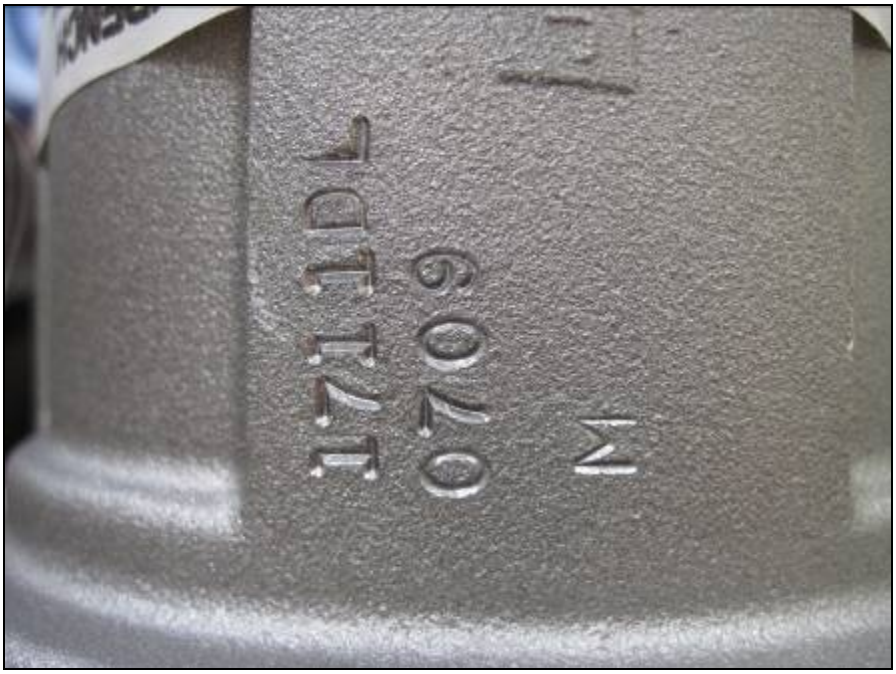


Figure 1I
OPW 1711DL -YYYY Kamvalok Product Coupler
(Required for fuel deliveries, see note under equipment list)

Figure 1J
OPW 1611AV-16YY Non-Rotatable Vapor Adaptor

Figure 1J
OPW 1611AVB-1625 Bronze Non-Rotatable Vapor Adaptor

Figure 1J
OPW 61VSA-1020-EVR Bronze Rotatable Vapor Adaptor

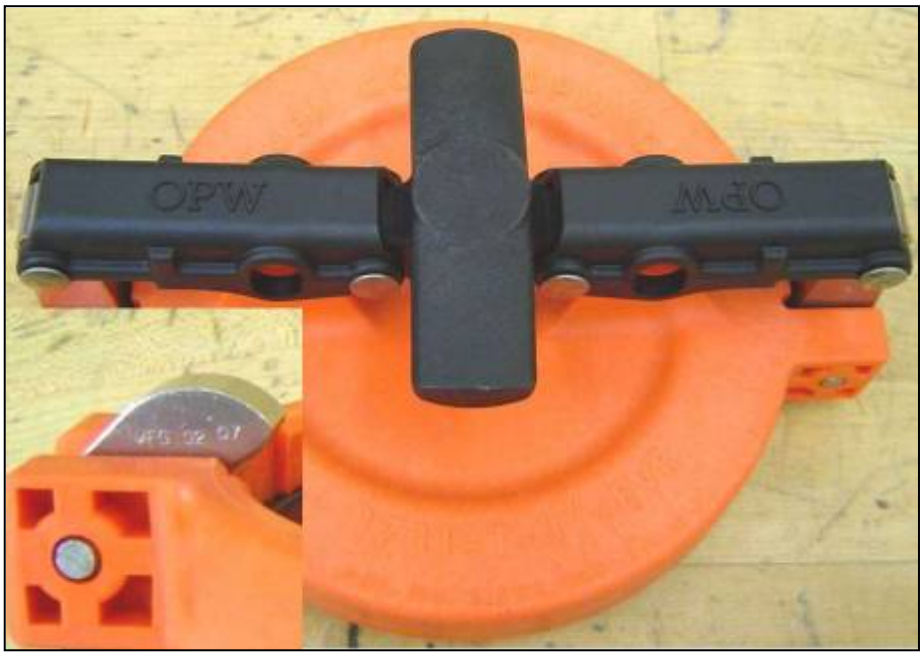


Figure 1K
OPW 1711T-7085-EVR Vapor Adaptor Dust Cap

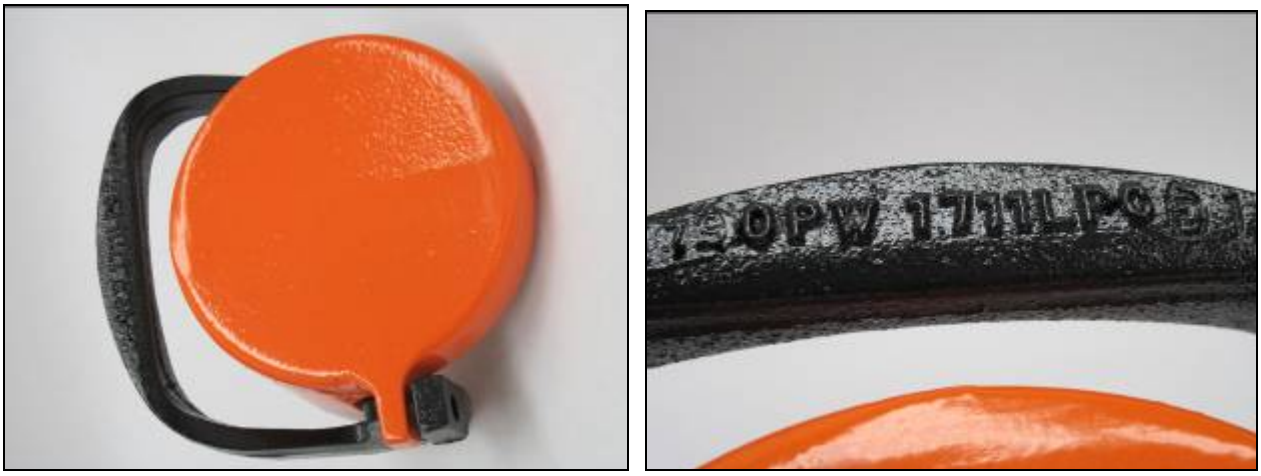


Figure 1K
OPW 1711LPC-0300 Ductile Iron Vapor Adaptor Dust Cap

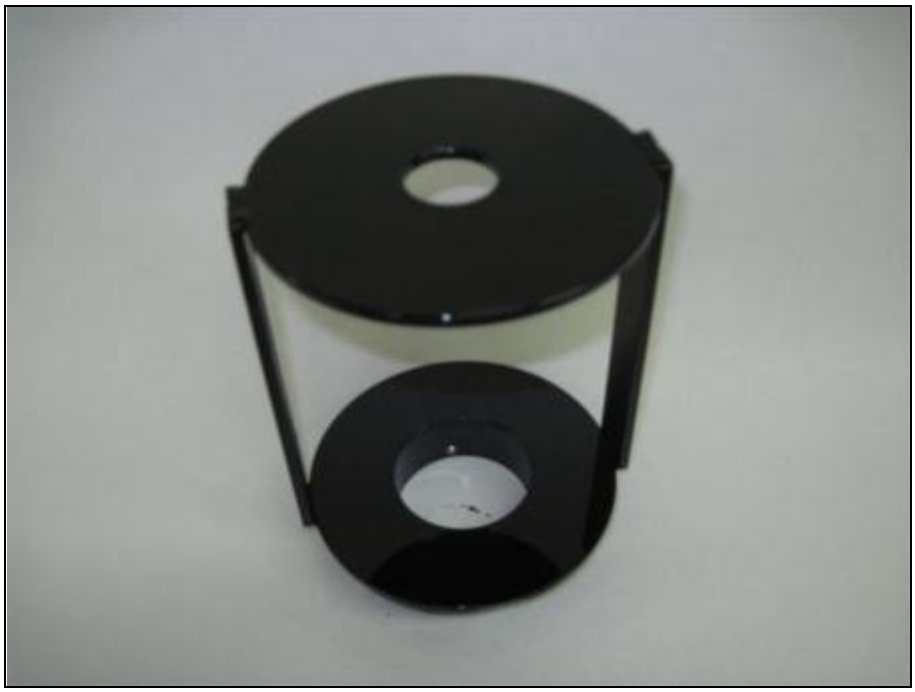


Figure 1L
OPW 204247 Dedicated Gauging Port Cage

Figure 1M
633AST-0XXX Female NPT Kamlok Adaptor for Dedicated Gauging Port

Figure 1N
OPW 53-00XX Double Tapped Bushing

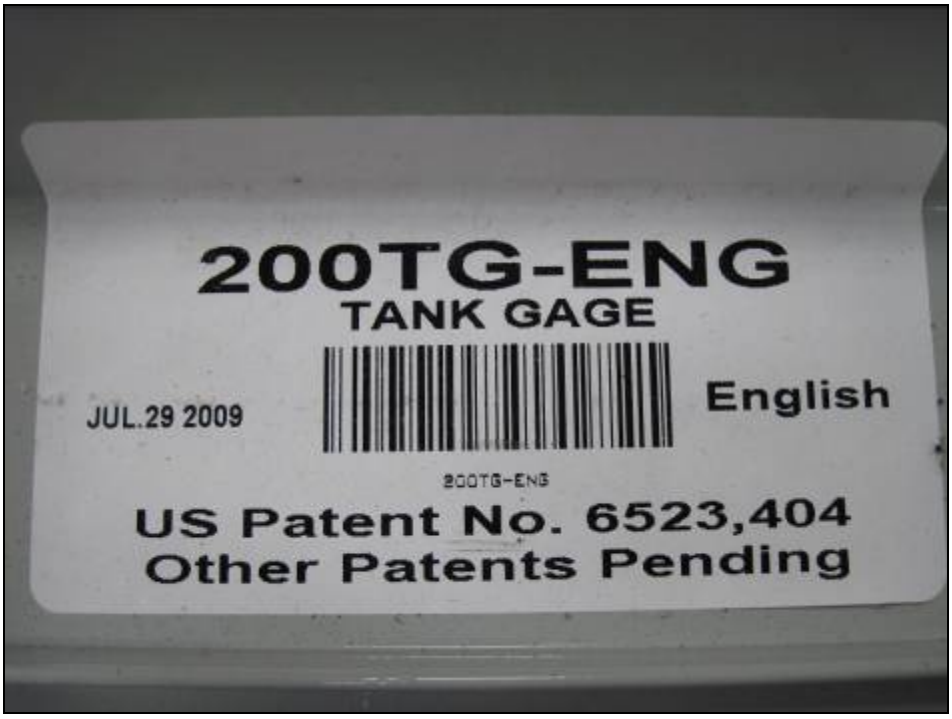


Figure 1O
OPW 200TG-XXXYY Mechanical Tank Gauge (optional)

Figure 1P
OPW 61T-02LL Tank Gauge Drop Tube
(For mechanical tank gauge only)

Figure 1Q
OPW X44TA-0100 Liquid Level Overfill Alarm (optional)

Figure 1R
OPW TGTA-0400
(Optional combo fitting for installation of tank gauge and overfill alarm)

Figure 1S
OPW 62M Monitoring Probe Cap and Adaptor Kit
(Optional Component for Automatic Tank Gauge Systems)

Exhibit 2
Installation, Maintenance, and Compliance Standards and Specifications

This exhibit contains the installation, maintenance and compliance standards and specifications applicable to the OPW Phase I Enhanced Vapor Recovery (EVR) system (OPW system) installed on aboveground storage tanks (AST).

General Specifications

1. Typical installations of the OPW System are shown in Figures 2A, 2B, 2C, 2D, 2E, 2F, 2G, 2H, 2I, 2J, 2K, 2L and 2M.

2. The OPW System shall be installed, operated, and maintained in accordance with ***ARB Approved Installation, Operation and Maintenance Manual for Executive Order VR-401-C OPW Phase I Enhanced Vapor Recovery System for Aboveground Storage Tanks*** (IOM).

3. Any repair or replacement of system components shall be done in accordance with IOM.

4. Unless otherwise specified in this Executive Order (EO), the OPW system shall comply with the applicable performance standards and performance specifications in CP-206.

5. Maintenance and repair of system components, including removal and installation of such components in the course of any required tests, shall be performed by OPW Certified Technicians.

Vapor Recovery and Non-rotatable Product (Kamvalok) Adaptors

1. OPW rotatable and non-rotatable vapor and product adaptors (Kamvalok adaptors) are not certified with an allowable leak rate and shall not leak. Compliance with this requirement shall be verified by the use of commercial liquid leak detection solution or by bagging, when the vapor containment space of AST is subjected to a positive, non-zero pressure. A vacuum check with commercial liquid detection solution may be used for leak detection on vapor recovery adaptors if the aboveground storage tank ullage space is in negative gauge pressure (leak detection solution must be visibly seen drawn into leak).

2. Rotatable vapor recovery adaptors shall be capable of at least 360-degree rotation and have an average static torque not to exceed 108 pound inch (9 pound-foot). Compliance with this requirement shall be demonstrated in accordance with **TP-201.1B, *Static Torque of Rotatable Phase I Adaptors (October 8, 2003)***.

3. The diameter of the Phase I vapor return piping of the AST shall be greater than or equal to the diameter of the Phase I product drop tube. In addition, no liquid condensate traps are allowed within the Phase I vapor return path piping under this configuration.

Product Coupler (Kamvalok Coupler)

Kamvalok product couplers shall fit the matching non-rotatable Kamvalok product adapters so that spillage of gasoline during fuel deliveries is minimized. During fuel deliveries, an OPW Kamvalok coupler (part numbers 1711D, 1711DL, 1712D, and 1712DL) shall be used with an OPW Kamvalok product adaptor (part numbers 1611AN and 1612AN). The Kamvalok coupler shall be provided by the fuel supplier or provided by the gasoline dispensing facility (GDF) operator.

Vapor and Product Adaptor Dust Caps

Dust caps with intact gaskets shall be installed on all Phase I product and vapor adaptors.

Emergency Vents

The emergency vents are not certified with an allowable leak rate and shall not leak. Compliance with this requirement shall be verified by the use of commercial liquid leak detection solution or by bagging, when the vapor containment space of AST is subjected to a non-zero pressure. (Note: Leak detection solution or bagging will detect leaks only when positive gauge pressure exists).

Direct Fill Spill Container Drain Valve

The direct fill spill container drain valve is configured to drain liquid directly into the ullage space of the AST. The drain valve is not certified with an allowable leak rate and shall not leak. Compliance with this requirement shall be verified by the use of commercial liquid leak detection solution or by bagging, when the vapor containment space of AST is subjected to a non-zero pressure. (Note: Leak detection solution or bagging will detect leaks only when positive gauge pressure exists).

Dedicated Gauging Port

An AST shall include a dedicated gauging port for determining the amount of gasoline. This determination shall be accomplished either manually (measuring gasoline levels using a gauging stick, mechanically, or electronically. If the determination is accomplished manually, the port shall have a drop tube which has the discharge opening entirely submerged when the liquid level is six inches above the bottom of the tank. The gauging port shall be permanently identified and include an OPW cap and Kamlok adapter. The gauging port shall not leak when no manual gauging is occurring or at any time when mechanical or electronic components are used. Compliance with

this requirement shall be verified by the use of commercial liquid leak detection solution or by bagging, when the vapor containment space of AST is subjected to a non-zero pressure. (Note: Leak detection solution or bagging will detect leaks only when positive gauge pressure exists).

Tank Gauge Components (Optional)

The tank gauge components are not certified with an allowable leak rate and shall not leak. Compliance with this requirement shall be verified by the use of commercial liquid leak detection solution or by bagging, when the vapor containment space of AST is subjected to a non-zero pressure. (Note: Leak detection solution or bagging will detect leaks only when positive gauge pressure exists).

Overfill Prevention Device

1. The overfill prevention device (overfill device) is designed to restrict the flow of gasoline delivered to AST when liquid levels exceed a specified capacity.

2. The overfill prevention device shall be installed below the OPW product adaptor (see Figures 2A and 2E) which has a built in poppet (Kamvalok) to prevent vapor leakage and spillage of product after delivery. The overfill prevention device is not certified with an allowable leak rate and the leak rate cannot be determined by testing. Testing to determine the leak rate of the overfill prevention device is not needed since leaks from other components (e.g., Kamvalok product and vapor adaptors, emergency vents, spill container drain valves, dedicated gauging port, tank gauge components, connectors, and fittings) can be determined by the use of commercial liquid leak detection solution or by bagging, when the vapor containment space of AST is subjected to a non-zero pressure. (Note: Leak detection solution or bagging will detect leaks only when positive gauge pressure exists).

3. The discharge opening of the fill pipe must be entirely submerged when the liquid level is six inches above the bottom of the tank as shown in figures 2A, 2E, and 2K (see figures for installation details).

Remote Fill Configuration

Under remote fill configurations (also referred to as side fill), the Phase I vapor recovery piping shall be constructed of galvanized-steel or an equivalent material that has been listed for use with gasoline. If a material other than galvanized steel is used AST operator shall provide the District a manufacturers' listing demonstrating that the material is compatible for use with gasoline. The diameter of the Phase I vapor return piping of the AST shall be greater than or equal to the diameter of the Phase I product drop tube. In addition, no liquid condensate traps are allowed within the Phase I vapor return path piping under this configuration.

Connections and Fittings

All connections and fittings not certified with an allowable leak rate shall not leak. Compliance with this requirement shall be verified by the use of commercial liquid leak detection solution or by bagging, when the vapor containment space of the AST is subjected to a non-zero pressure. (Note: Leak detection solution or bagging will detect leaks only when positive gauge pressure exists).

Maintenance Records

Each GDF operator/owner shall keep records of maintenance performed at the facility. Such record shall be maintained on site or in accordance with district requirements or policies. The records shall include at a minimum the maintenance, inspection, or test date, repair date to correct test failure, maintenance, inspection, or test performed, affiliation, telephone number, name and Certified Technician Identification Number of individual conducting maintenance or test. Additional information may be required in accordance with district requirements. An example of a Phase I Maintenance Record is shown in Figure 2N.

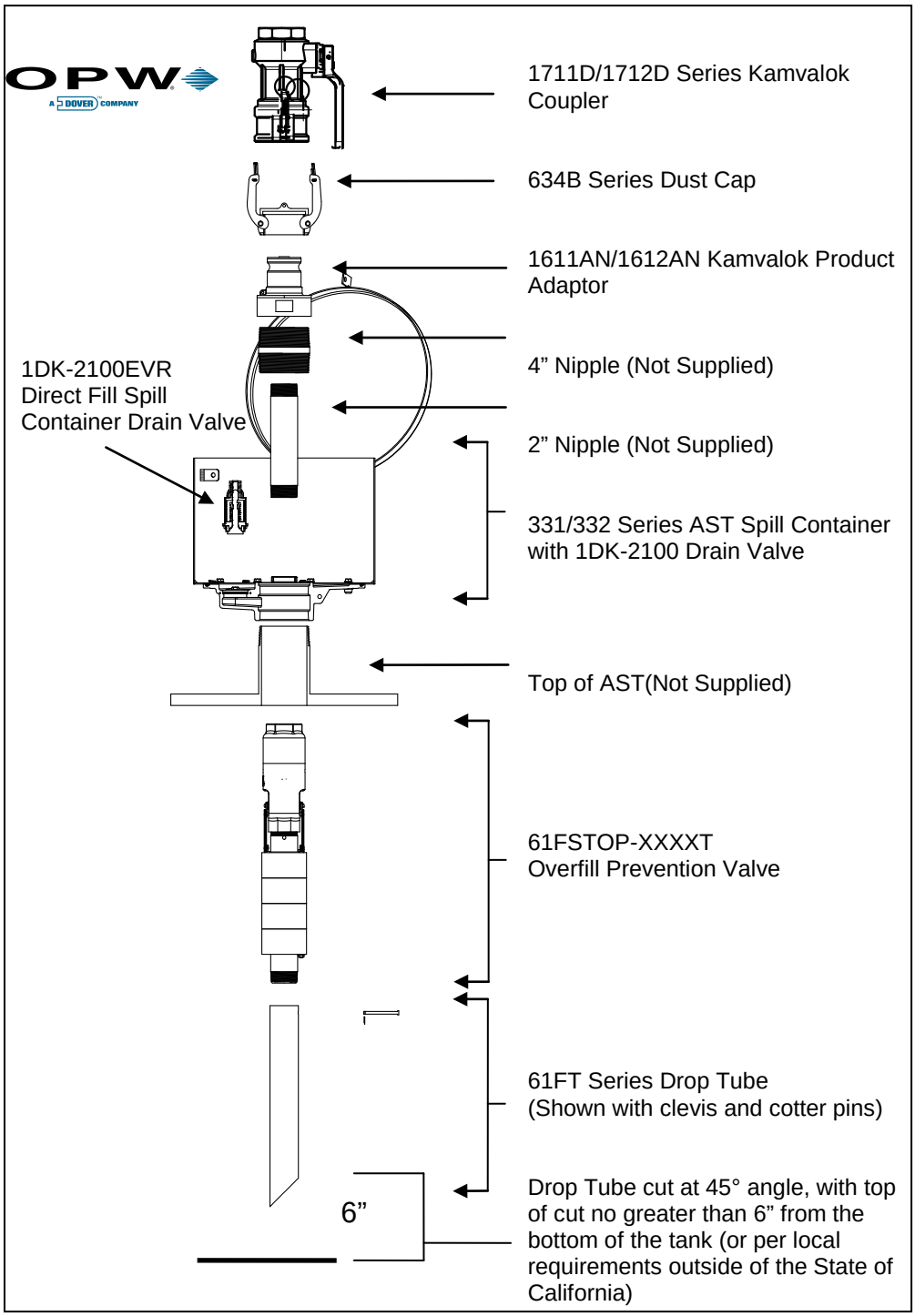
Table 2-1
AST Compliance Standards and Specifications

Component / System	Test Method	Standard or Specification
Rotatable Phase I Vapor Adapters	TP-201.1B	Minimum, 360-degree rotation Maximum, 108 pound-inch average static torque
Phase I Adaptors	Leak Detection Solution or Bagging	No Leaks
Emergency Vents	Leak Detection Solution or Bagging	No Leaks
Spill Container Drain Valve	Leak Detection Solution or Bagging	No Leaks
Dedicated gauging port with drop tube and tank gauge components	Leak Detection Solution or Bagging	No Leaks
Vapor Recovery System	Exhibit 4 (Static Pressure)	As specified in Exhibit 4 of this Executive Order and/or CP-206
All connections and fittings certified without an allowable leak rate	Leak Detection Solution or Bagging	No Leaks

Table 2-2
Maintenance Intervals for System Components

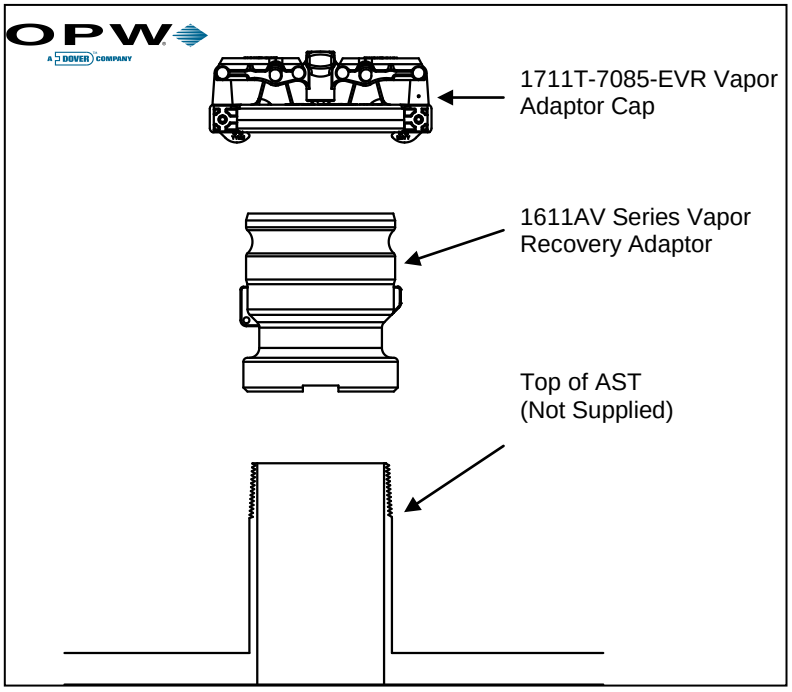
Manufacturer	Component	Maintenance Interval
OPW	Tank Gauge Components	Annual
OPW	Dust Caps	Annual
OPW	Emergency Vents	Annual
OPW	Phase I Product and Vapor Adaptors	Annual
OPW	Spill Container Drain Valve	Annual

Figure 2A
Typical Direct Fill (Product Side) Installation of OPW Phase I EVR System for AST



Note: An OPW 53-00XX series double tapped bushing (optional component for direct fill configurations) may be required depending on the type of Kamvalock adapter being used.

Figure 2B
Typical Vapor Recovery Adapter Configurations of OPW Phase I EVR System for AST



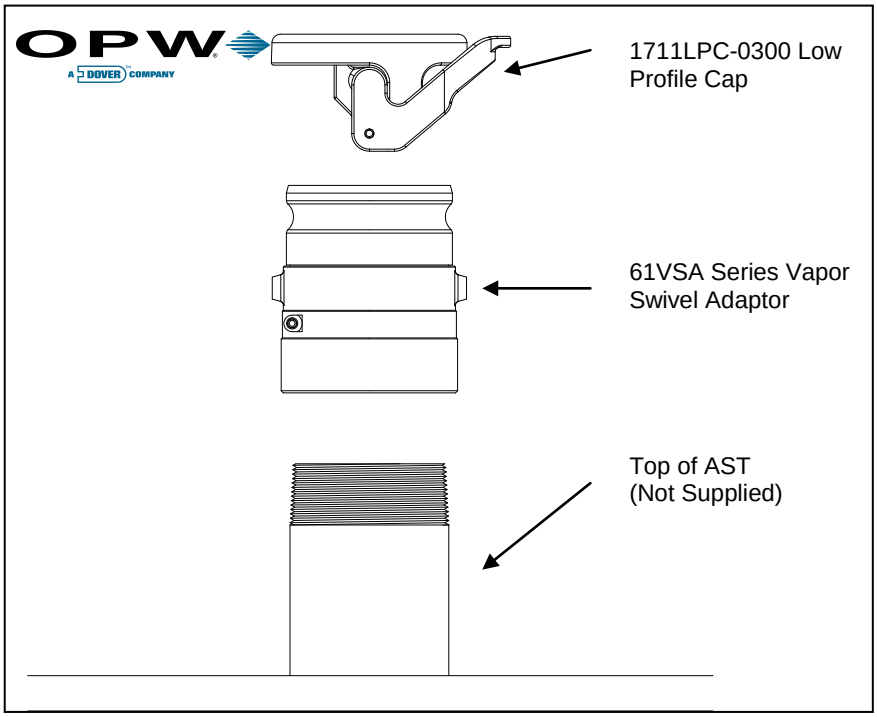
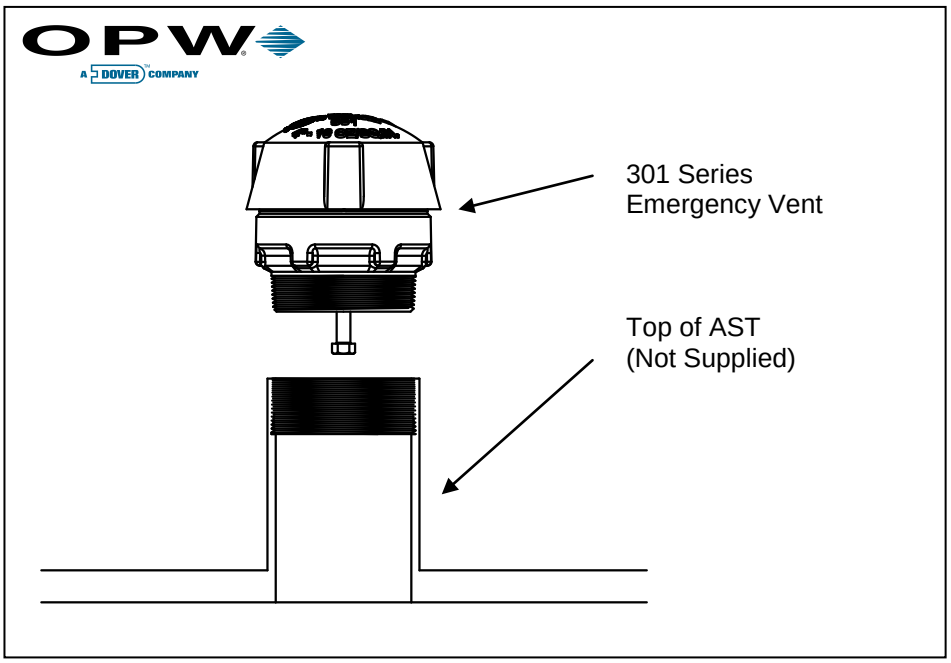
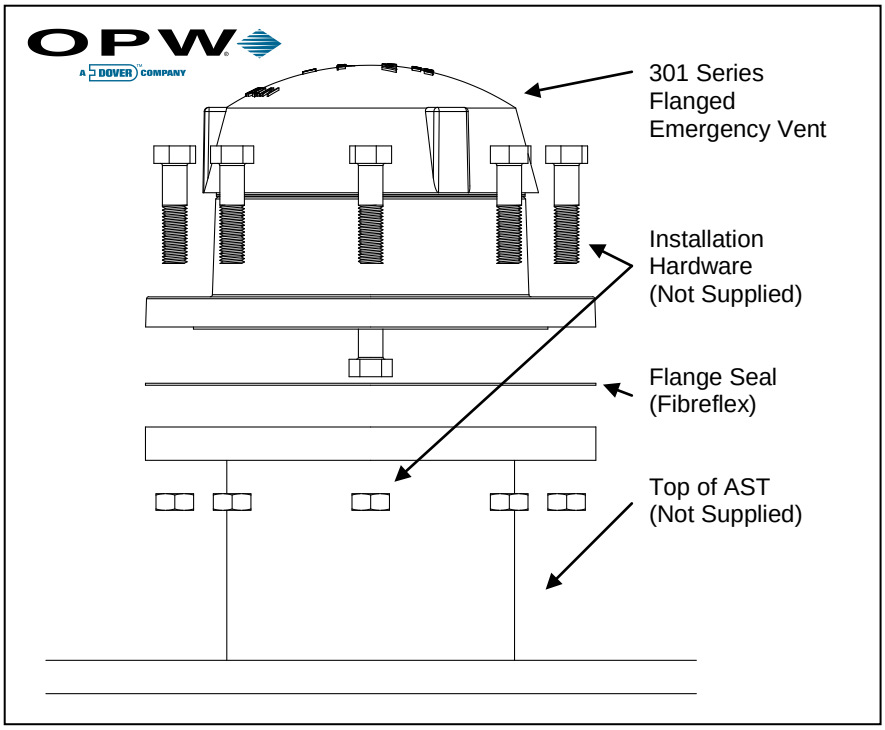


Figure 2C
Typical Emergency Vent Valve Configurations of OPW Phase I EVR System for AST





Note: For flange models use gasket material made by Fibreflex. More information is available at http://www.fibreflex.com.

Figure 2D
Typical Remote Fill Configuration of OPW Phase I EVR System for AST
(Note: The remote spill container is not a vapor recovery component.)

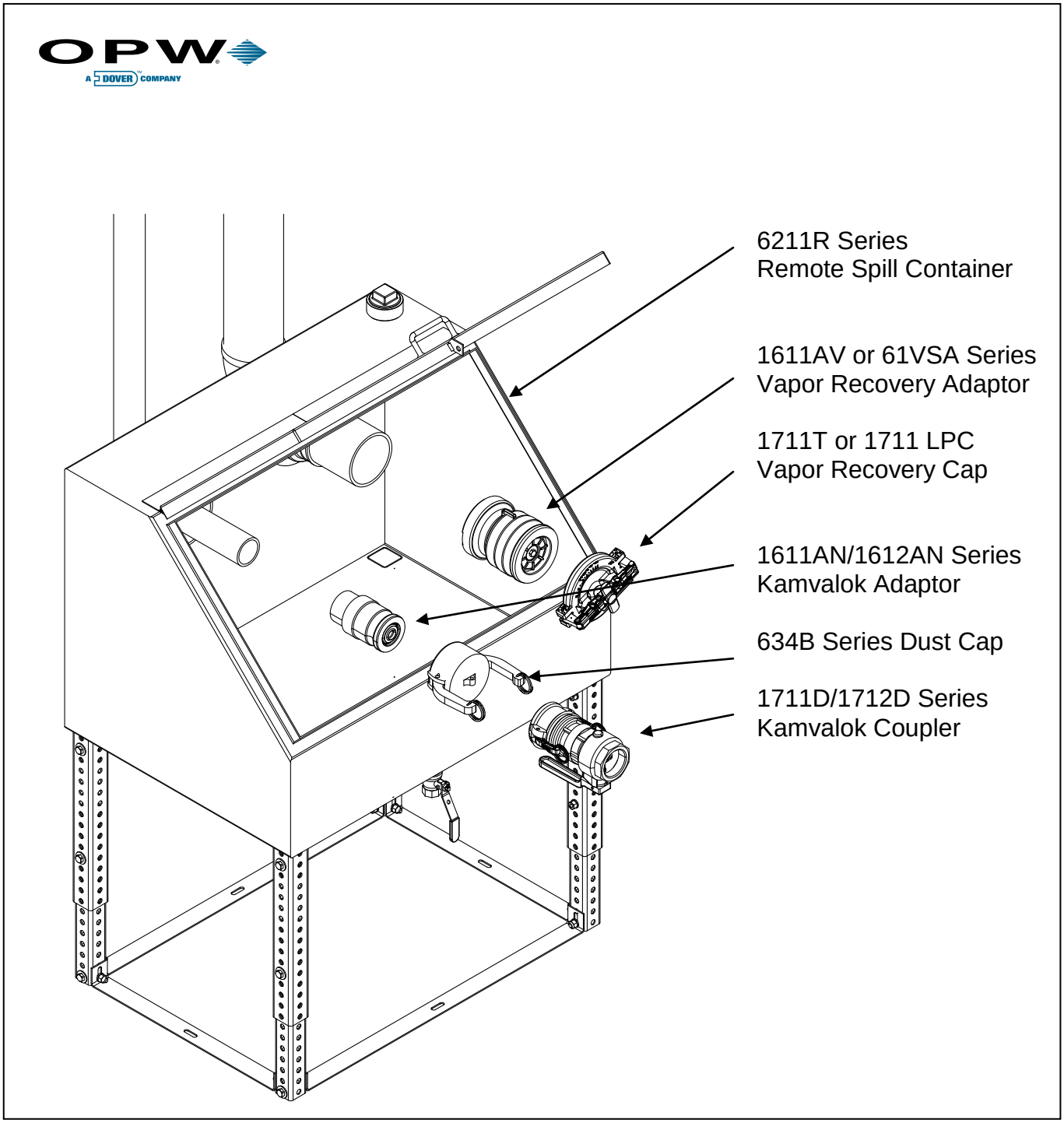


Figure 2E
Typical Remote Product Pathway Configuration for AST – Tank Side

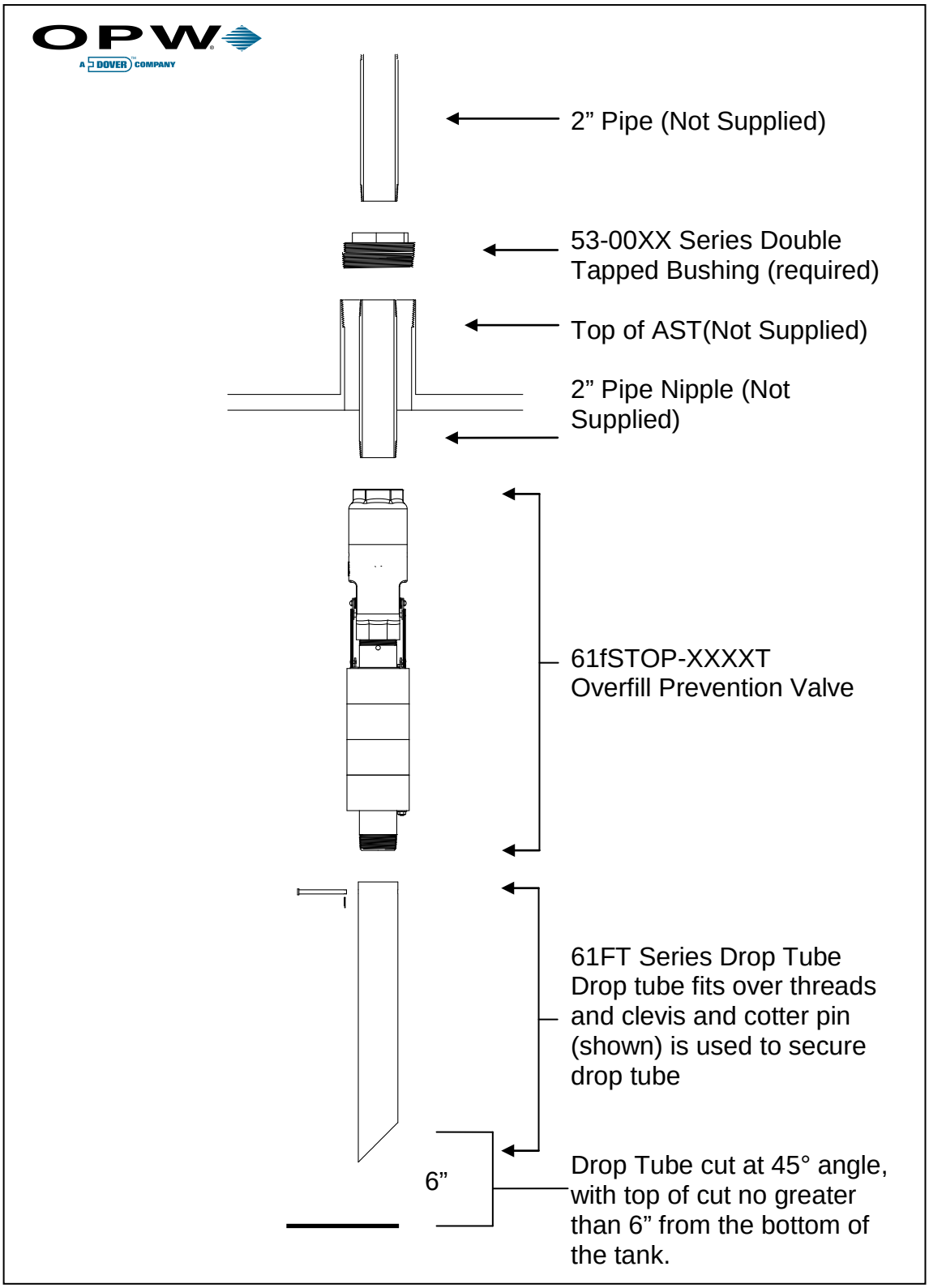
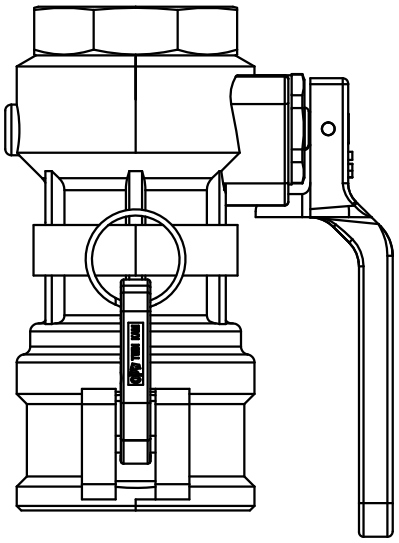
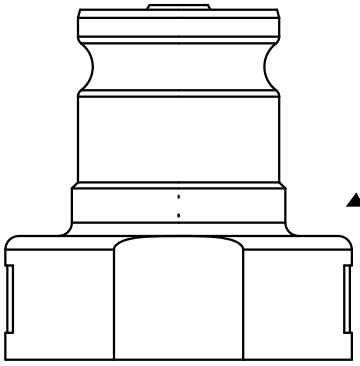


Figure 2F
Typical OPW Kamvalok Coupler and Adaptor



1711D/1712D Series
Kamvalok Coupler

Note: During fuel deliveries, the OPW Kamvalok coupler shall be used with the OPW Kamvalok product adaptor. The Kamvalok coupler can be provided by the fuel supplier or provided by the GDF operator.



1611AN/1612AN
Kamvalok Adaptor

Figure 2G
Typical Mechanical Tank Gauge Configuration of OPW Phase I EVR System for AST (optional)

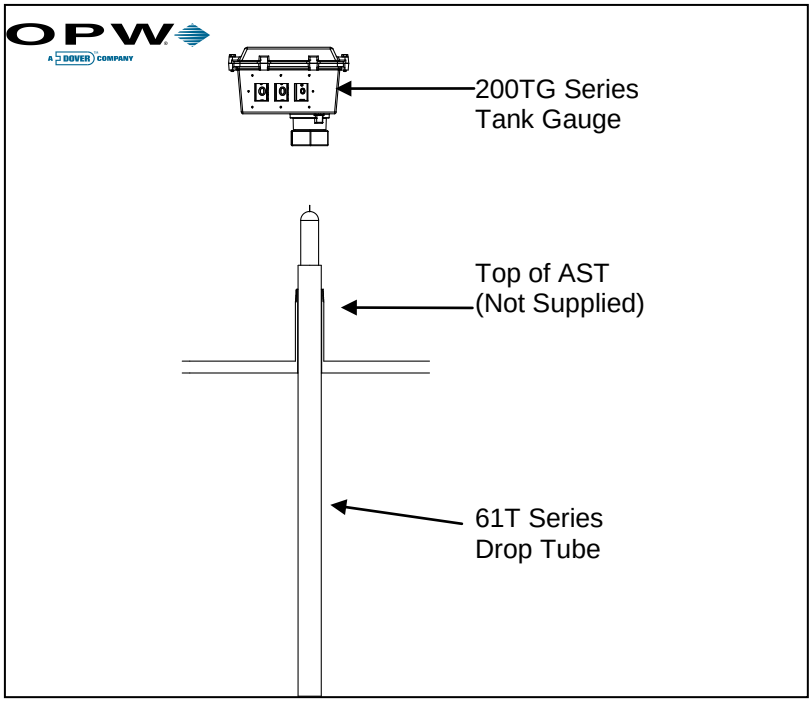


Figure 2H
Typical Tank Alarm Configuration of OPW Phase I EVR System for AST (optional)

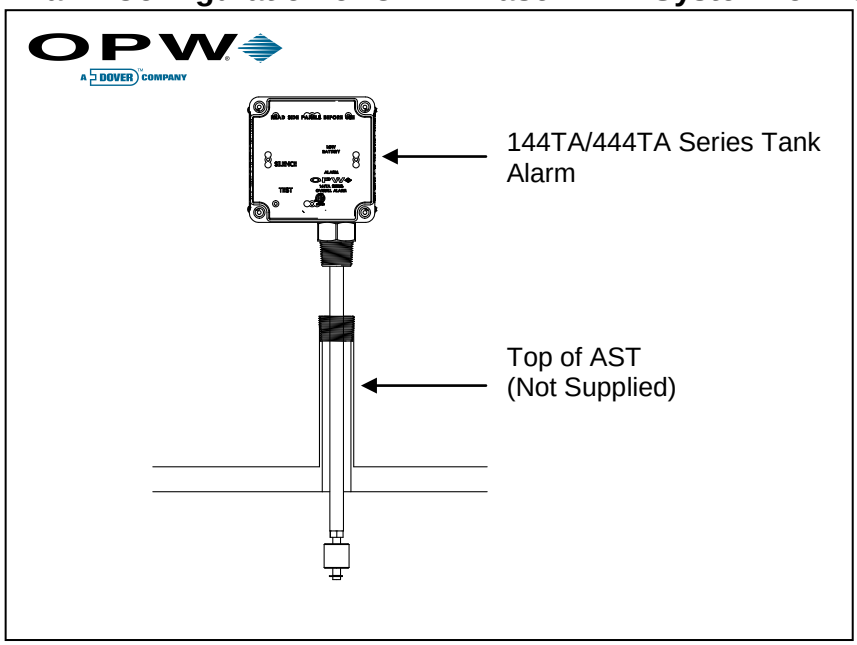


Figure 2I
Typical Tank Gauge and Alarm Combination Configuration of OPW Phase I EVR System for AST (optional)

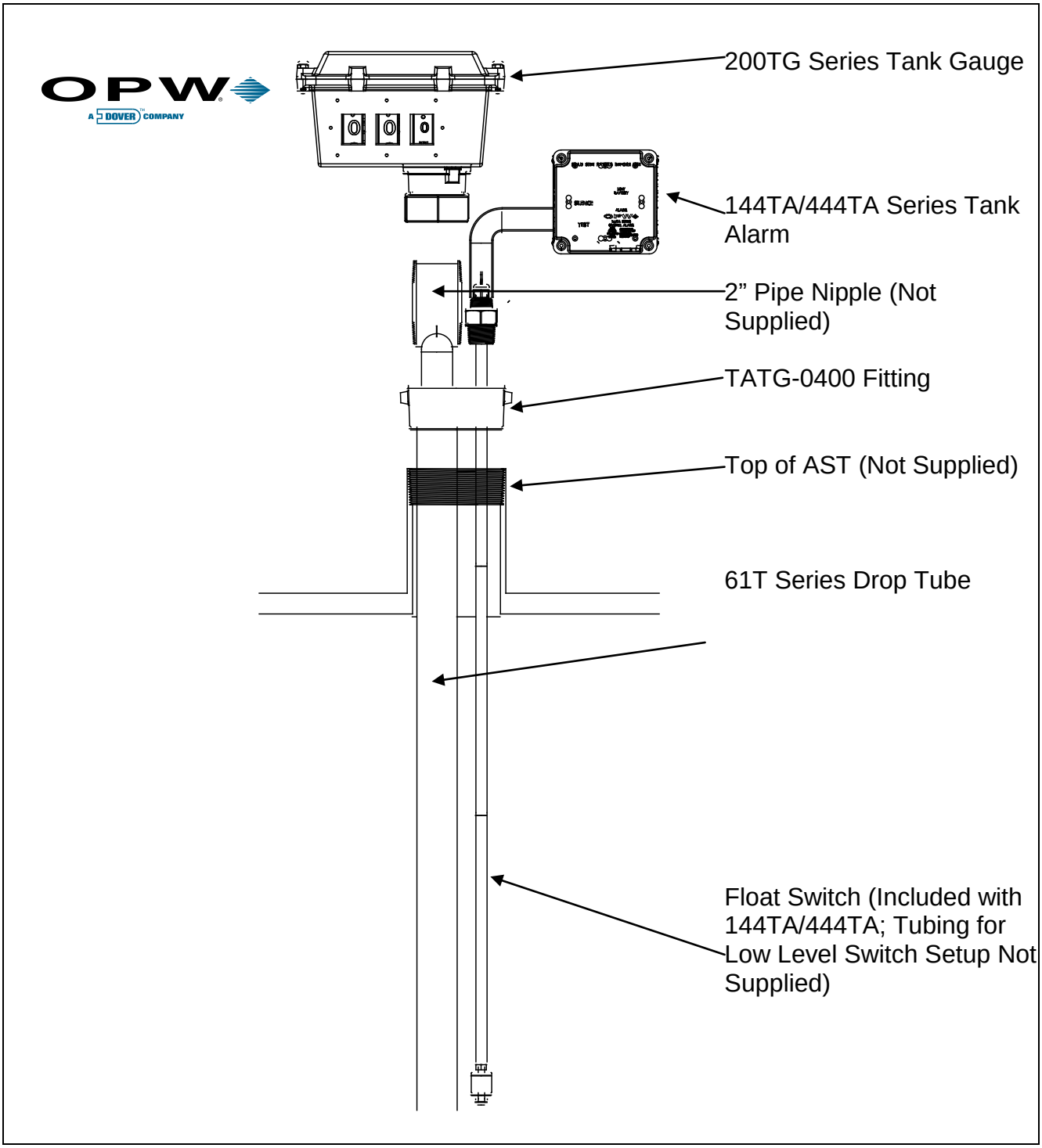


Figure 2J
Typical Dedicated Gauging Port with Drop Tube of OPW Phase I EVR System for AST

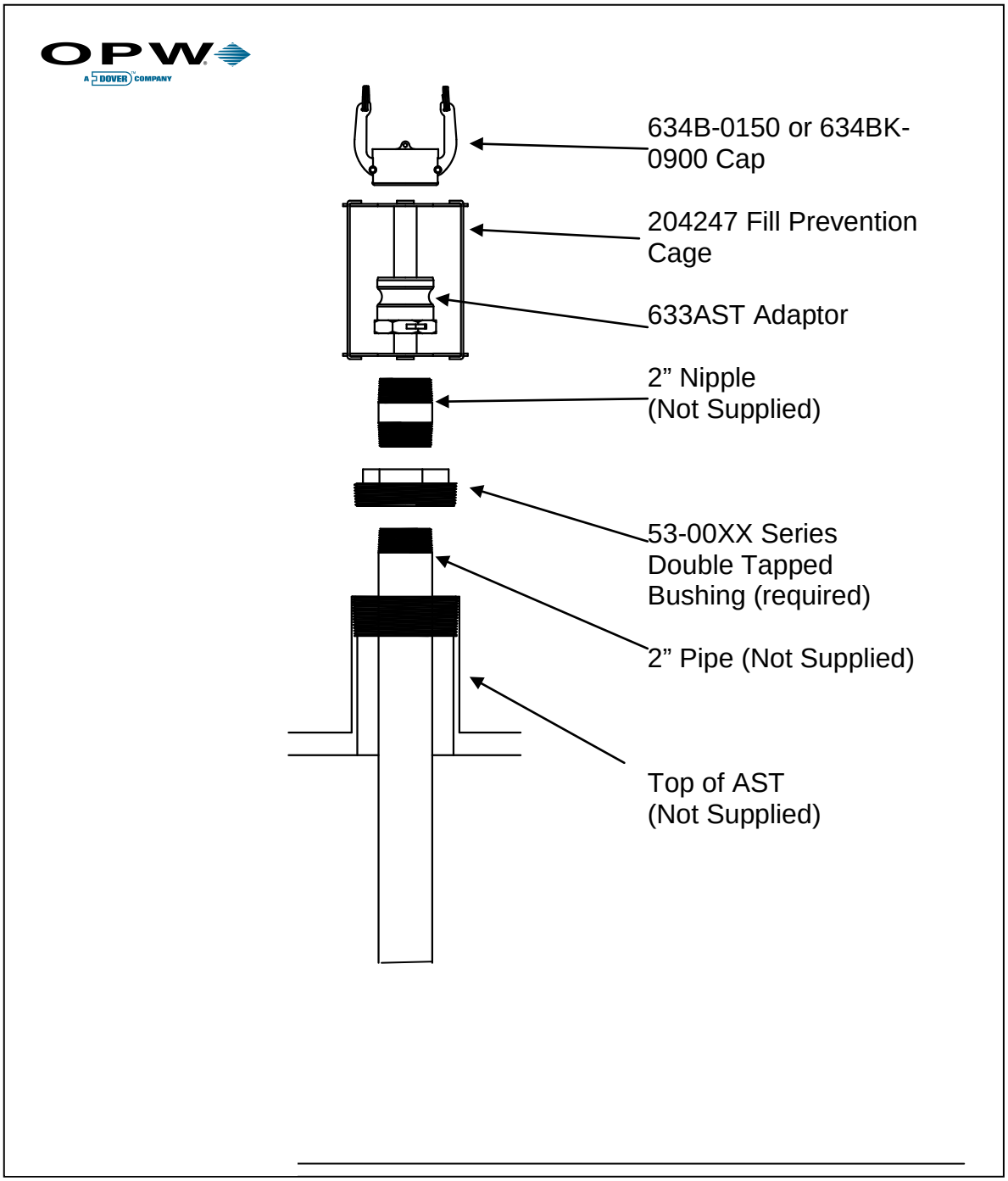
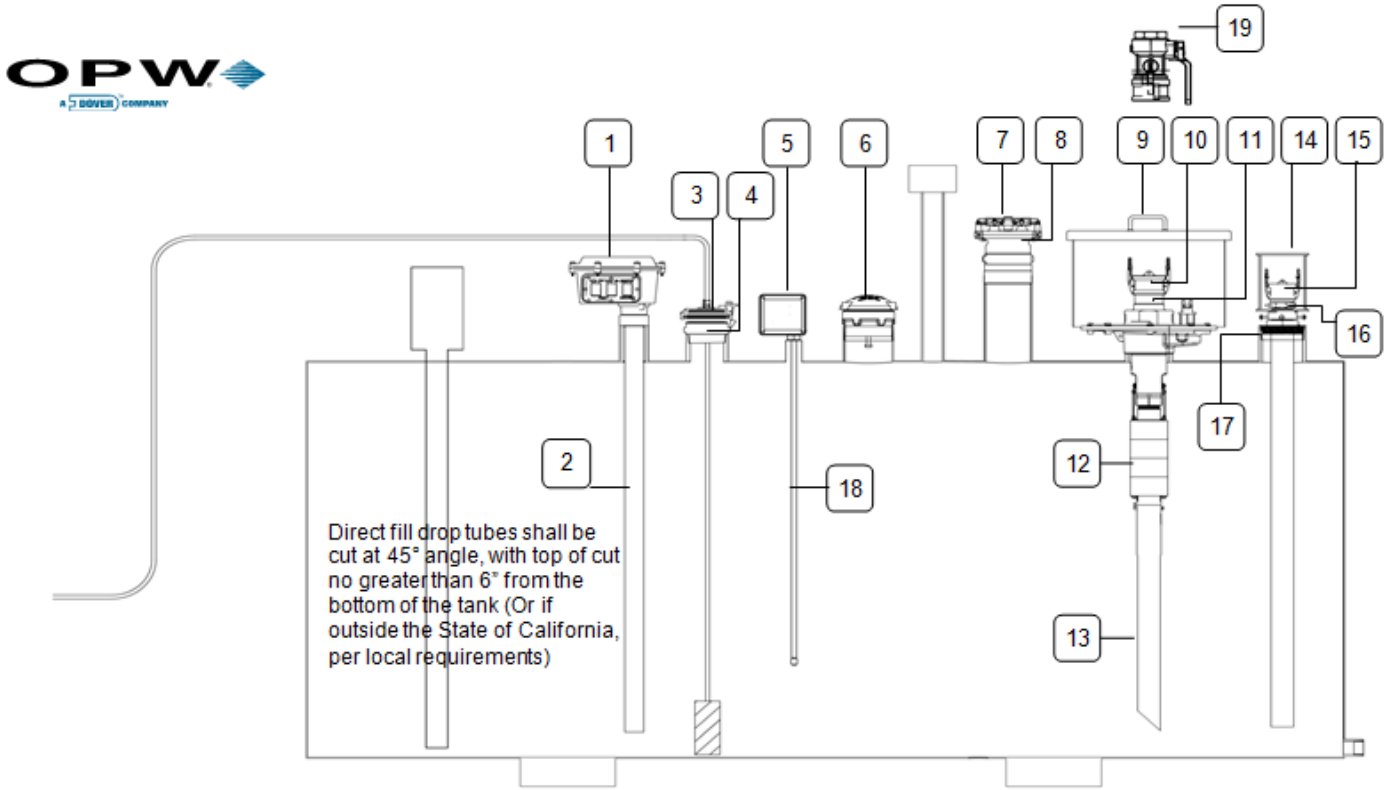


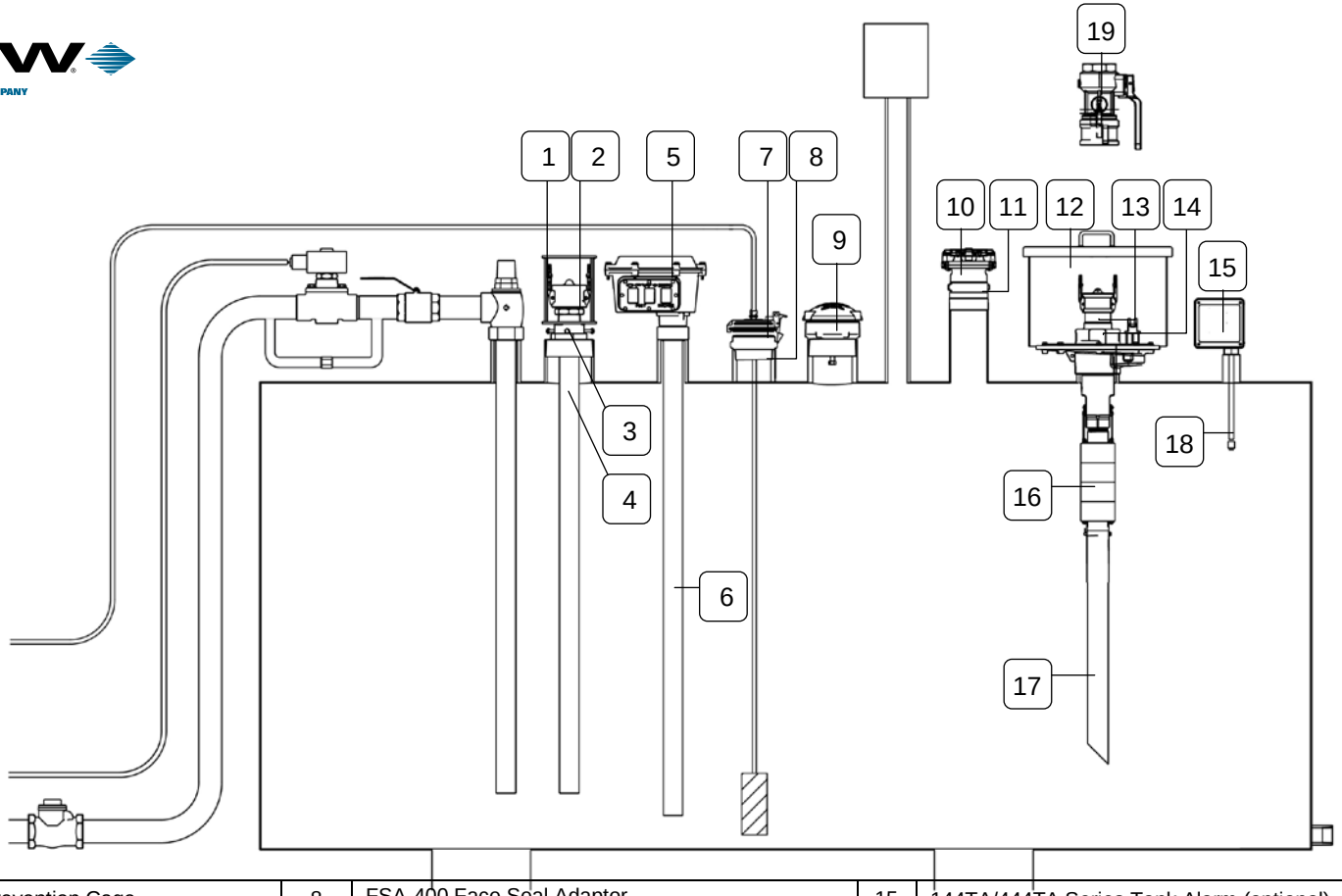
Figure 2K
Typical Configuration of OPW Phase I EVR System for AST with Direct Fill Spill Container



1	200TG Series Tank Gauge	8	1611AV/AVB Series Vapor Recovery Adaptor or 61VSA-1020 EVR	15	634B-0150 or 634BK-0090 Cap
2	61T Series Drop Tube	9	331/332 Series Spill Container	16	633AST-2190 Adaptor`
3	62M Monitoring Cap	10	634B or 634BK Series Dust Cap	17	53-00XX Series Double-Tapped Bushing *
4	FSA-400 Face Seal Adaptor	11	1611AN/1612AN Series Kamvalok® Adaptor	18	44TA-LLFS Liquid Level Float Switch (optional)
5	144TA/444TA Series Tank Alarm (optional)	12	61*f*STOP-XXXXT Series Overfill Prevention Valve	19	1711D-YYYY Series Kamvalok® Coupler
6	301 Series Emergency Vent	13	61FT Series Drop Tube	*OPW 53-00XX bushing required for dedicated gauging port, optional for direct fill spill containers	
7	1711T-7085 or 1711LPC Series Vapor Recovery Cap	14	204247 Fill Prevention Cage		

Figure 2L

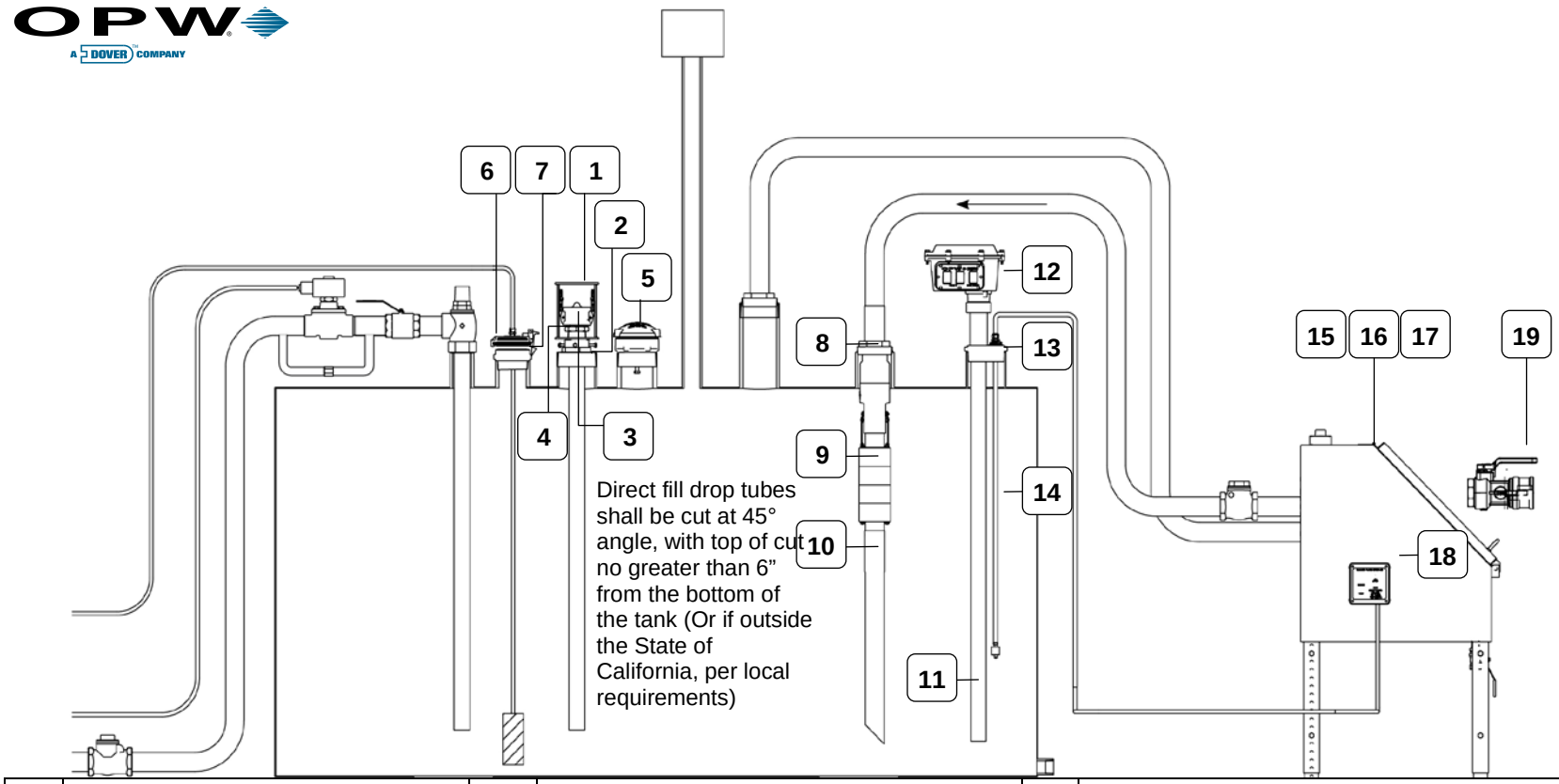
Typical Configuration of OPW Phase I EVR System for AST with Direct Fill Spill Container and Remote Dispenser



Direct fill drop tubes shall be cut at 45° angle, with top of cut no greater than 6" from the bottom of the tank (Or if outside the State of California, per local requirements)

1	204247 Fill Prevention Cage	8	FSA-400 Face Seal Adaptor	15	144TA/444TA Series Tank Alarm (optional)
2	634B-0150 or 634BK-0090 Cap	9	301 Series Emergency Vent	16	61ƒSTOP-XXXXT Series Overfill Prevention Valve
3	633AST-0XXX Adaptor	10	1711T or 1711LPC Series Vapor Recovery Cap	17	61FT Series Drop Tube
4	53-00XX Series Double Tapped Bushing *	11	1611AV or 61VSA Series Vapor Recovery Adaptor	18	44TA-LLFS Liquid Level Float Switch (optional)
5	200TG Series Tank Gauge	12	331/332 Series Spill Container	19	1711D-YYYY Series Kamvalok® Coupler
6	61T Series Drop Tube	13	634B Series Dust Cap	*OPW 53-00XX bushing required for dedicated gauging port, optional for direct fill spill container.	
7	62M Monitoring Cap	14	1611AN/1612AN Series Kamvalok® Adaptor		

Figure 2M
Typical Configuration of OPW Phase I EVR System for AST with Remote Fill and Remote Dispenser



1	204247 Fill Prevention Cage	8	53 Series Bushing **	15	1611AN / 1612AN Series Kamvalok® Adaptor*
2	53-00XX Series Double Tapped Bushing	9	61ƒSTOP-XXXXT Series Overfill Prevention Valve	16	1611AV or 61VSA Series Vapor Recovery Adaptor*
3	634B-0150 or 634B-0090 Series Dust Cap	10	61FT Series Drop Tube	17	1711T or 1711LPC Series Vapor Recovery Cap*
4	633AST-0XXX Adaptor	11	61T Series Drop Tube	18	144TA/444TA Series Tank Alarm (optional)
5	301 Series Emergency Vent	12	200TG Series Tank Gauge (optional)	19	1711D-YYYY Series Kamvalok® Coupler
6	62M Monitoring Cap	13	TGTA-0400 4" Gauge/Alarm Combo Fitting (optional)	* OPW 53-00XX bushing is required for remote fill configurations and dedicated gauge ports	
7	FSA-400 Face Seal Adaptor	14	44TA-LLFS Liquid Level Float Switch (optional)		

Figure 2N
Example of a GDF Maintenance Record

Date of Maintenance/ Test/Inspection/Failure	Repair Date To Correct Test Failure	Maintenance/Test/Inspection Performed and Outcome	Affiliation	Name and Certified Technician Identification Number of Individual Conducting Maintenance or Test	Telephone Number

Exhibit 3
Manufacturing Performance Standards and Specifications

The OPW Phase I EVR System for aboveground storage tanks (AST) and all components shall be manufactured in compliance with the applicable Phase I performance standards and specifications in CP-206, as well as the requirements specified in this Executive Order. All components shall be manufactured as certified; no change to the equipment, parts, design, materials or manufacturing process shall be made unless approved in writing by the Executive Officer. Unless specified in Exhibit 2 or in the ***ARB Approved Installation, Operation and Maintenance Manual for the OPW Phase I Enhanced Vapor Recovery System for Aboveground Storage Tanks***, the requirements of this section apply to the manufacturing process and are not appropriate for determining the compliance status of a gasoline dispensing facility (GDF).

Pressure/Vacuum Vent Valves

Factory testing, shipping and labeling of pressure/vacuum vent (PV) valves are described in Air Resources Board's Executive Orders (EO) VR-301 series and VR-302 series for Standing Loss Control of existing and new ASTs, respectively.

Vapor Recovery and Non-rotatable Product (Kamvalok) Adaptors

1. The vapor recovery and non-rotatable product adaptors shall not leak.

2. The vapor recovery adaptor cam and groove shall be manufactured in accordance with the cam and groove specifications shown in Figure 4B of CP-206.

3. Each OPW vapor recovery adaptor and Kamvalok non-rotatable product adapter shall be tested at the factory, and shall meet the applicable performance specifications listed in Table 3-1 and shall have affixed to it a card or label listing these specifications and a statement that the adaptor complied with such specifications when tested in the factory.

Spill Container and Drain Valves

Each spill container drain valve shall be tested at the factory. The spill container drain valve is configured to drain liquid directly into the ullage space. The drain valve is not certified with an allowable leak rate and shall not leak.

Drop Tube Overfill Prevention Device

Each Drop Tube Overfill Prevention Device shall be tested at the factory. The overfill device is installed below the OPW product adaptor (see figures 2A and 2E, Exhibit 2) which has a built in poppet (Kamvalok) to prevent spillage of product after delivery and vapors from escaping.

Emergency Vents

Each emergency vent shall be tested at the factory. Emergency vents are not certified with an allowable leak rate and shall not leak.

Tank Gauge Components

Tank gauge components shall be tested at the factory. Tank gauge components are not certified with an allowable leak rate and shall not leak

Kamvalok Product Coupler

Each Kamvalok product coupler shall be tested at the factory. Kamvalok product couplers shall fit the matching non-rotatable Kamvalok product adapters.

Table 3-1
Manufacturing Component Standards and Specifications

Component	Test Method	Standard or Specification
Phase I Adaptors	Exhibit 4	No Leaks
Phase I Vapor Adaptors *	Micrometer	Cam and Groove Standard (CP-206)
Phase I Rotatable Adaptors	TP-201.1B	Minimum, 360-degree rotation Maximum, 108 pound-inch average static torque
Spill Container Drain Valve	Exhibit 4	No Leaks
Overfill Prevention Device	Exhibit 4	No Leaks
Emergency Vents	Exhibit 4	No Leaks

* Product adaptor does not meet cam and groove standard. This was deemed acceptable because the propriety Kamvalok coupler shall be used for product delivery.

Exhibit 4
Determination of Static Pressure Performance of Vapor Recovery Systems at Gasoline Dispensing Facilities with Aboveground Storage Tanks

Definitions common to all certification and test procedures are in:

D-200 Definitions for Vapor Recovery Procedures

For the purpose of this procedure, the term "ARB" refers to the California Air Resources Board, and the term "Executive Officer" refers to the ARB Executive Officer or his or her authorized representative or designee.

1. PURPOSE AND APPLICABILITY

The purpose of this test procedure is used to quantify the vapor tightness of an aboveground storage tank (AST) installed at a gasoline dispensing facility (GDF).

This test procedure is used to determine the static pressure performance standard of a vapor recovery system during the certification process and subsequently to determine compliance with that performance standard for in use aboveground storage tanks equipped with either a Phase I system or Phase I and Phase II systems.

The applicability of this test procedure for static pressure performance is for installations of Phase I or Phase 1 and Phase II systems with AST certified by:

CP-206 Certification Procedure for Vapor Recovery Systems at Gasoline Dispensing Facilities Using Aboveground Storage Tanks

2. PRINCIPLE AND SUMMARY OF TEST PROCEDURE

The entire vapor recovery system is pressurized with nitrogen to two (2.0) inches water column (wc). The system pressure is then allowed to decay for five (5) minutes. The acceptability of the final pressure is based upon the vapor system ullage.

3. BIASES AND INTERFERENCES

3.1 For tanks equipped with vapor recovery processor systems, the processor must be isolated or the processor outlet is capped. Leakage at the processor will indicate a system component leak.

3.2 Leaks in the test equipment will bias the results toward non-compliance. Prior to

conducting the test, this bias is eliminated by conducting a leak check of the equipment.

3.3 There shall be no Phase I bulk product deliveries into the storage tank(s) within three (3) hours prior to this test. There shall be no product dispensing within thirty (30) minutes prior to this test. There shall be no Air to Liquid or Volume to Liquid Volumetric Ratio Test (TP-201.5 or equivalent) conducted within the twenty-four (24) hour period immediately prior to this test.

3.4 Product levels less than four (4) inches above the highest opening at the bottom of the submerged drop tube may bias the test toward noncompliance.

3.5 For systems which utilize a destructive processor, power to the collection unit and the processor shall be turned off during testing.

3.6 For vacuum-assist systems with positive displacement vacuum pumps, which locate the vacuum producing device in-line between the Phase II vapor riser and the storage tank, the following requirements shall apply:

3.6.1 A valve shall be installed at the vacuum producing device. When closed, this valve shall isolate the vapor passage downstream of the vacuum producing device.

3.6.2 The upstream vapor passage (nozzle to vacuum producing device) shall also be tested. Methodology for this test shall be submitted to the Executive Officer for approval prior to submission of test results or shall be conducted in accordance with the procedures set forth in the applicable ARB Executive Order.

4. EQUIPMENT SPECIFICATIONS

4.1 Traffic Cones. If needed for safety, use traffic cones to encircle the area while the test is being conducted.

4.2 Care must be exercised to prevent exposure of testing personnel to benzene, a carcinogen. Use of appropriate safety gear such as gloves and respirator is suggested.

4.3 Use commercial grade nitrogen in a high pressure cylinder, equipped with a two-stage pressure regulator and one pressure per square inch gauge (psig) pressure relief valve. The minimum and maximum nitrogen feed rates into the system shall be 1.0 and 5.0 cfm (cubic feet per minute) respectively.

4.4 The System Leak Test Assembly is shown in Figure 1. Use a modified vapor cap compatible with the Phase I vapor adaptor. The vapor cap shall be equipped with a nitrogen inlet port.

4.5 Use a Dwyer flowmeter, Model RMC-104, or equivalent, to determine the required pressure setting of the delivery pressure gauge on the nitrogen supply pressure regulator. This pressure shall be set such that the nitrogen flowrate is between 1.0 and 5.0 cfm.

4.6 Electronic pressure measuring devices or digital pressure indicators shall be used. The maximum full-scale range of the device shall be 10 inches water column. The minimum accuracy shall be 1.5 percent of full scale and the pressure measuring device shall be readable to the nearest 0.01 inches water column. A copy of the most current calibration of shall be kept with the equipment. Instrument shall be calibrated every six months.

4.7 Stopwatch. Use a stopwatch accurate to within 0.10 seconds to time the one-minute pressure stabilization period, and the five-minute decay test period.

4.8 Leak Detection Solution or a Combustible Gas Indicator. Any liquid solution designed to detect vapor leaks may be used to verify the pressure integrity of system components during this test; or a combustible gas detector that complies with the requirements of U.S. EPA Method 21, “Determination of Volatile Organic Compounds Leaks”, 40 CFR Ch. 1, Part 60, App. A-7 (36 FR 24877, December 23, 1971) and section 5 of this test procedure. Personnel shall assume that the combustible gas detector will be operated in an explosive atmosphere and comply with all pertinent regulations.

5. CALIBRATION PROCEDURE

5.1 The electronic pressure measuring device or digital pressure indicator shall be calibrated using a National Institute of Standards and Technology (NIST) traceable standard or reference standard traceable to NIST within 180 days prior to conducting the testing and the calibration. In addition, calibration shall be conducted after any repairs or alterations to the pressure measuring or indicating device. Calibrations shall be conducted per manufacturer’s instructions, ensuring it complies with the minimum accuracy requirement of 1.5 percent of full scale. A copy of the most current calibration shall be kept with the equipment.

5.2 The flowmeter shall be calibrated every 180 days using a NIST traceable standard or a reference standard traceable to NIST as specified by the manufacturer’s instructions.

5.3 Calibrate the combustible gas detector per the manufacturer’s recommendation. Calibration gas shall be certified traceable to NIST-SRM.

5.3.1 The calibration gases must be certified according to one of the following options:

5.3.1.1 The EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (EPA-600/R-12/531, May 2012), or

5.3.1.2 To an analytical accuracy of ± 2 percent, traceable to a reference material approved by the National Institute of Standards and Technology (NIST) and recertified annually.

5.3.2 Documentation. Information on calibration gas cylinders shall be entered into a log identifying each cylinder by serial number. Sufficient information shall be maintained to allow a determination of the certification status of each calibration gas and shall include: (1) the data put in service, (2) assay result, (3) the dates the assay was performed, (4) the organization and specific personnel who performed the assay, and (5) the date taken out of service.

6. PRE-TEST PROCEDURES

6.1 Place the traffic cones around the perimeter of the testing area, allowing sufficient space to safely conduct the test.

6.2 Electronic manometers shall have a warm-up period of at least 15 minutes followed by a five-minute drift check. If the drift exceeds 0.01 inches water column, the instrument should not be used.

6.3 Record system information on Form 1.

6.4 The minimum ullage during the test shall be 25 percent of the tank capacity and the maximum ullage during the test shall be 75 percent of the tank capacity. For manifolded tanks, the minimum ullage during the test shall be 25 percent of the aggregate tank capacity and the maximum ullage during the test shall be 75 percent of the aggregate tank capacity.

6.5 Determine the allowable system leak rate using Equation 8-1 in section 8.

6.6 Ensure the nozzle(s) are properly hung in the dispenser boot and all dispenser cabinet covers are in place. No dispensing shall be allowed during the test.

6.7 If a steel-braided nitrogen supply line is not used, a ground strap should be employed during the introduction of nitrogen into the system.

6.8 This test shall be conducted with the dust caps removed from both the product and the vapor coupler(s).

6.9 If the Phase I containment box is equipped with a drain valve, this test shall be conducted with the drain valve installed.

6.10 Conduct visual inspection of vapor recovery components to ensure no cracks, tears, or other anomalies are present that may cause a failure of the leak test.

6.11 Install system leak test assembly. An example is shown in Figure 1. Additional examples can be found in TP-201.3 (Figures 1-3).

7. TEST PROCEDURE

7.1 Observe the initial storage tank pressure. If the initial pressure is greater than one-half (0.50) inch H_2O gauge, proceed to Section 7.1.1. If the initial pressure is less than zero (0.00) inch H_2O gauge, proceed to Section 7.1.2. In the case where the storage tank pressure is between 0.00 and 0.50 inches H_2O, proceed to section 7.2.

7.1.1 If the initial storage tank pressure is greater than one-half (0.50) inch H_2O gauge, carefully bleed off the excess pressure in accordance with all applicable safety procedures for a maximum of 30 seconds. Do not allow the tanks to remain open to atmosphere for more than 30 seconds or the ingestion of fresh air and additional vapor growth may result. Start the stopwatch and measure the storage tank pressure for three (3) minutes. If the 3-minute pressure exceeds 0.50 inches H_2O or continues to change at a rate exceeding $\pm$0.02 inches H_2O in 3 minutes, repeat this Section. Several attempts may be required.

7.1.2 If the initial storage tank pressure is less than zero (0.00) inches H_2O gauge, slowly introduce nitrogen so that the storage tank pressure is between zero (0.00) and one-half (0.50) inches H_2O gauge. Start the stopwatch and measure the storage tank pressure for three (3) minutes. If the 3-minute pressure is not between 0.00 and 0.50 inches H_2O or continues to change at a rate exceeding $\pm$0.02 inches H_2O in 3 minutes, repeat this Section.

7.2 Open the nitrogen gas supply valve, regulate the delivery pressure to at least 10 psig, and pressurize the vapor system (or subsystem for individual vapor return line systems) to or slightly above 2 inches water column. The minimum and maximum nitrogen feed rates in to the system shall be 1.0 and 5.0 cfm respectively. It is critical to maintain the flow until both flow and pressure stabilize, indicating temperature and pressure stabilization in the tanks. Close the nitrogen supply valve.

7.3 Check the system leak test assembly using leak detection solution to verify that the test equipment is leak tight. Quickly remove the vapor cap assembly.

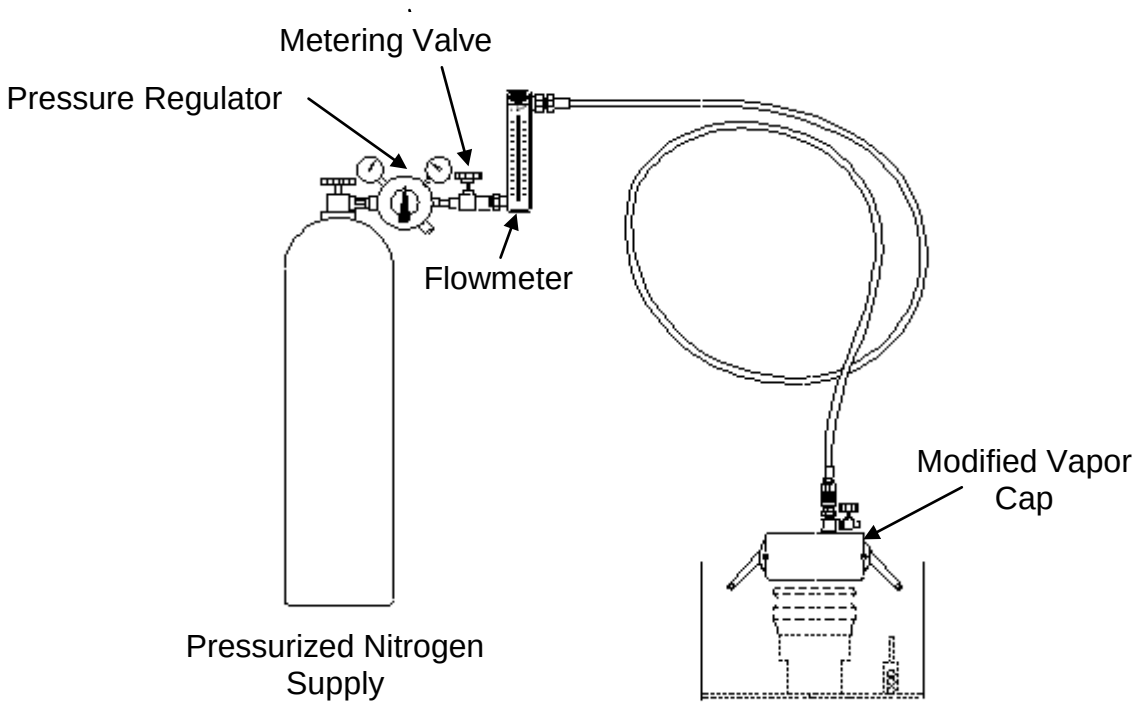
7.4 Re-open the nitrogen supply valve, and reset the tank pressure to reestablish a pressure slightly greater than 2 inches water column. Close the nitrogen supply valve and start the stopwatch when the pressure reaches an initial pressure of 2.0 inches of water column.

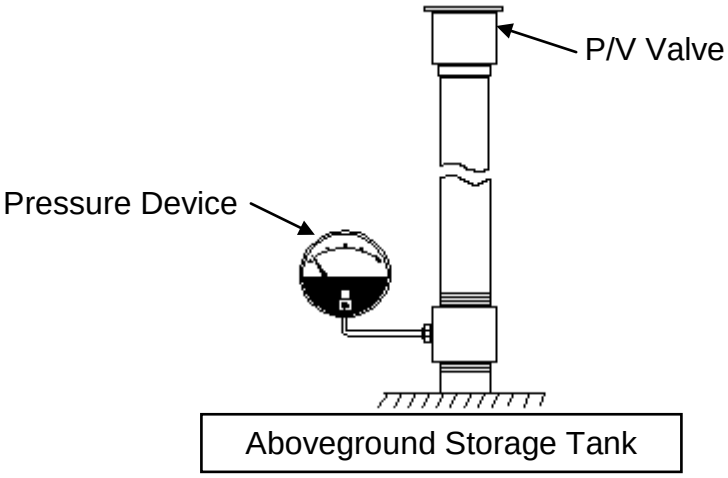
7.5 At one-minute intervals during the test, record the system pressure on Form 1. After five minutes, record the final system pressure on Form 1. Carefully remove the system leak test assembly.

7.6 Use Equation 8-1 in section 8 or Table 1 to determine the compliance status of the facility by comparing the final five-minute pressure with the minimum allowable pressure.

Figure 1

Typical System Leak Test Assembly





8. CALCULATING RESULTS

Minimum Allowable Pressure

The minimum allowable pressure after five (5) minutes, with an initial pressure of 2.0 inches water column, shall be calculated as shown below, or obtained from Table 1:

Equation 8-1

$$P_f = 2e^{(-223.9/V)}$$

where:

P_f	=	Minimum pressure after 5 minutes, inches water column
V	=	Ullage of the system, gallons
e	=	Constant equal to 2.71828
2	=	Initial starting pressure, inches water column
-223.9	=	Decay constant for a 5 minute test

9. REPORTING RESULTS

Report the results as indicated on Form 1. District may require the use of alternate forms provided they include the same minimum parameters identified in Form 1.

10. ALTERNATIVE TEST PROCEDURES

This procedure shall be conducted as specified. Modifications to this test procedure shall not be used to determine compliance unless prior written approval has been obtained from the ARB Executive Officer, pursuant to Section 15 of Certification Procedure CP-206.

Form 1
Summary of Source Test Data

Static Pressure Performance Test	
GDF Name and Address: GDF Representative and Title: GDF Phone #: GDF # _____ Manifolded? Y or N	PHASE II SYSTEM TYPE (Check One) Balance _____ VacAssist _____ Other _____ Manufacturer: _____ Permit Conditions:

TANK # :	1	2	3	4
1. Product Grade				
2. Actual Tank Capacity, gallons				
3. Gasoline Volume				
4. Ullage, gallons (ullage = capacity-volume)				
5. Initial Pressure (inches water column)				
6. Pressure After 1 Minute				
7. Pressure After 2 Minutes				
8. Pressure After 3 Minutes				
9. Pressure After 4 Minutes				
10. Final Pressure After 5 Minutes				
11. Allowable Final Pressure				

Test Conducted by: Date of Test:	Test Company: Test Contractor Certification Number: Expiration Date:

TABLE 1
Leak Rate Criteria

ULLAGE (GALLONS)	MINIMUM PRESSURE AFTER 5 MINUTES, (INCHES OF WATER COLUMN)
100	**0.21**
150	0.45
200	**0.65**
250	0.82
300	**0.95**
350	1.05
400	**1.14**
450	1.22
500	**1.28**
550	1.33
600	**1.38**
650	1.42
700	**1.45**
750	1.48
800	**1.51**
850	1.54
900	**1.56**
950	1.58
1,000	**1.60**
1,200	1.66
1,400	**1.70**
1,600	1.74
1,800	**1.77**
2,000	1.79
2,200	**1.81**
2,400	1.82
2,600	**1.83**
2,800	1.85
3,000	**1.86**
3,500	1.88
4,000	**1.89**
4,500	1.90
5,000	**1.91**
6,000	1.93
7,000	**1.94**
8,000	1.94
9,000	**1.95**
10,000	1.96
15,000	**1.97**
20,000	1.98

Exhibit 5
Alternate Phase I EVR Installation Configurations for Existing Aboveground Storage Tanks

Existing aboveground storage tanks (AST) may be configured with a limited number of available bung openings and bung diameters. In an effort to provide flexibility in regards to Phase I EVR equipment installation, the figures in this Exhibit provide examples of typical alternate Phase I EVR installation configurations.

General Specifications

1. Alternate installation configurations for the OPW Phase I EVR System (OPW System) for existing ASTs are shown in Figures 5A, 5B, and 5C.

2. A properly sized, dedicated opening must be provided for the emergency vent in accordance with the ***ARB Approved Installation, Operation and Maintenance Manual for the OPW Phase I Enhanced Vapor Recovery System for Aboveground Storage Tanks***.

3. The OPW System shall be installed, operated, and maintained in accordance with the ***ARB Approved Installation, Operation and Maintenance Manual for the OPW Phase I Enhanced Vapor Recovery System for Aboveground Storage Tanks***.

4. Any repair or replacement of system components shall be done in accordance with the ***ARB Approved Installation, Operation and Maintenance Manual for the OPW Phase I Enhanced Vapor Recovery System for Aboveground Storage Tanks***.

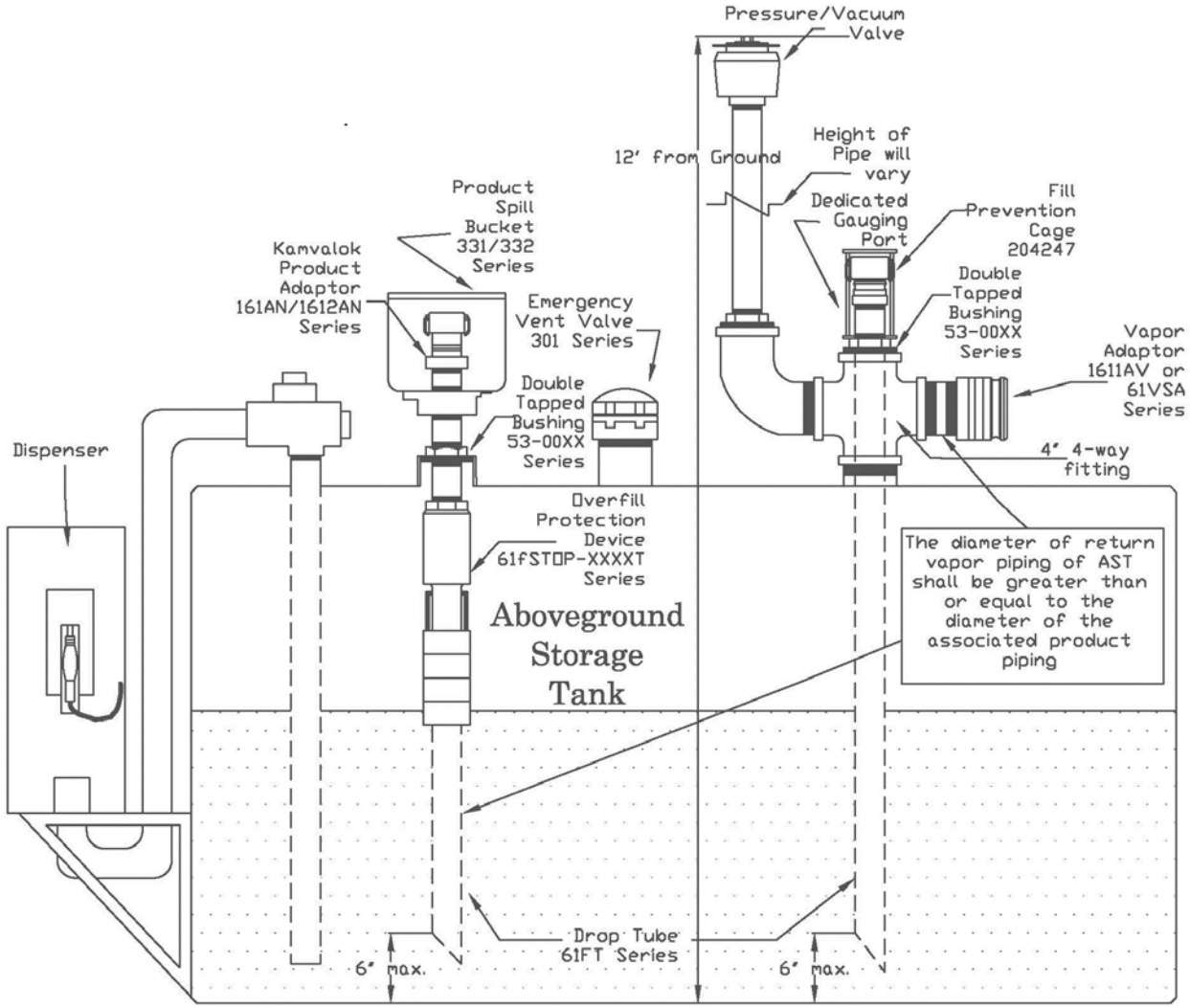
5. Unless otherwise specified in this Executive Order (EO), the OPW System shall comply with the applicable performance standards and performance specifications in CP-206.

6. Per Exhibit 2 of the Executive Order, “The diameter of return vapor piping of AST shall be greater than or equal to diameter of the associated drop tube.”

7. Maintenance and repair of system components, including removal and installation of such components in the course of any required tests, shall be performed by OPW Certified Technicians.

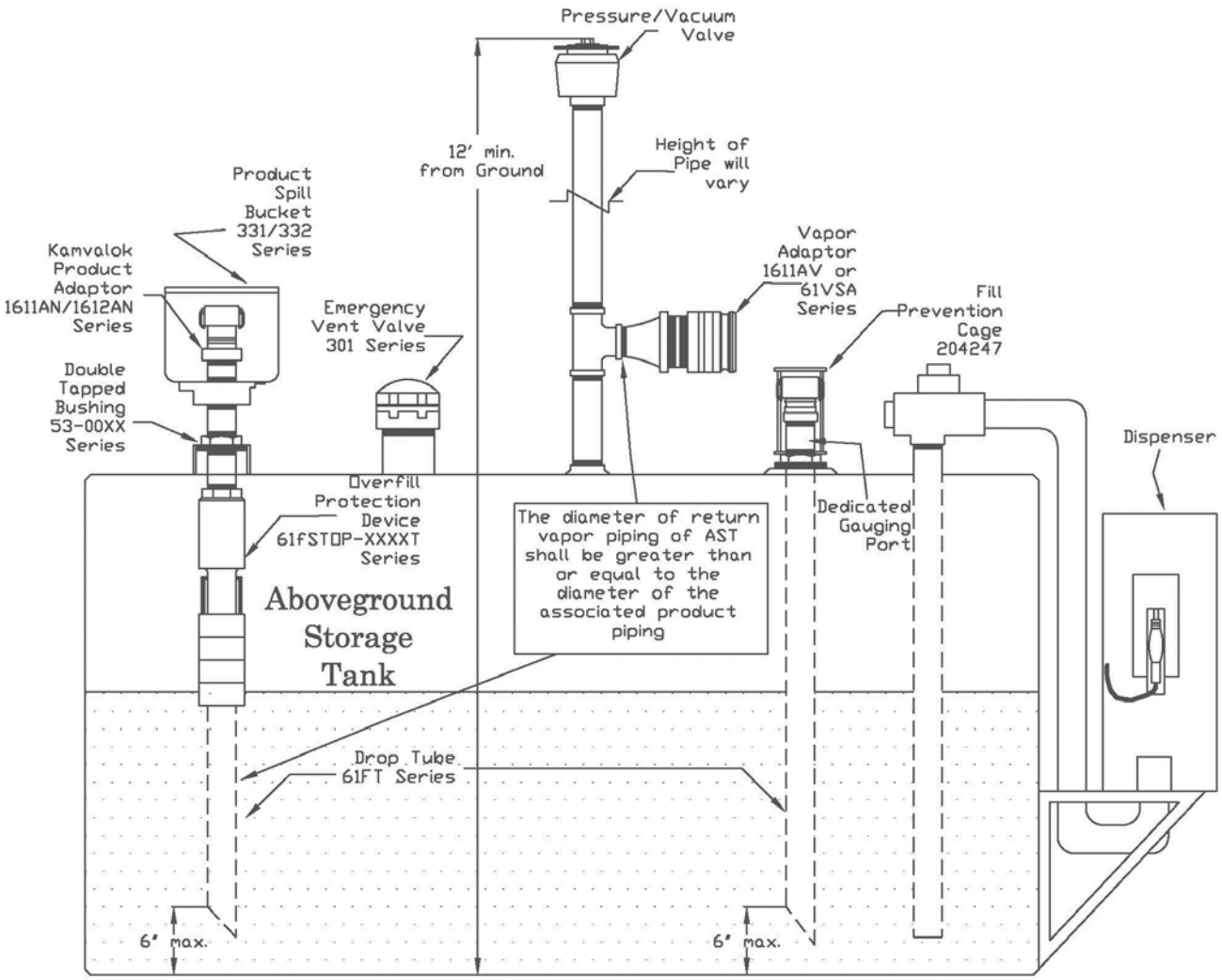
8. Other alternate installation configurations may be utilized if approved by the local air pollution control district and fire marshal/fire agency.

Figure 5A
Alternate Phase I Installation Configurations for Existing Aboveground Storage Tanks



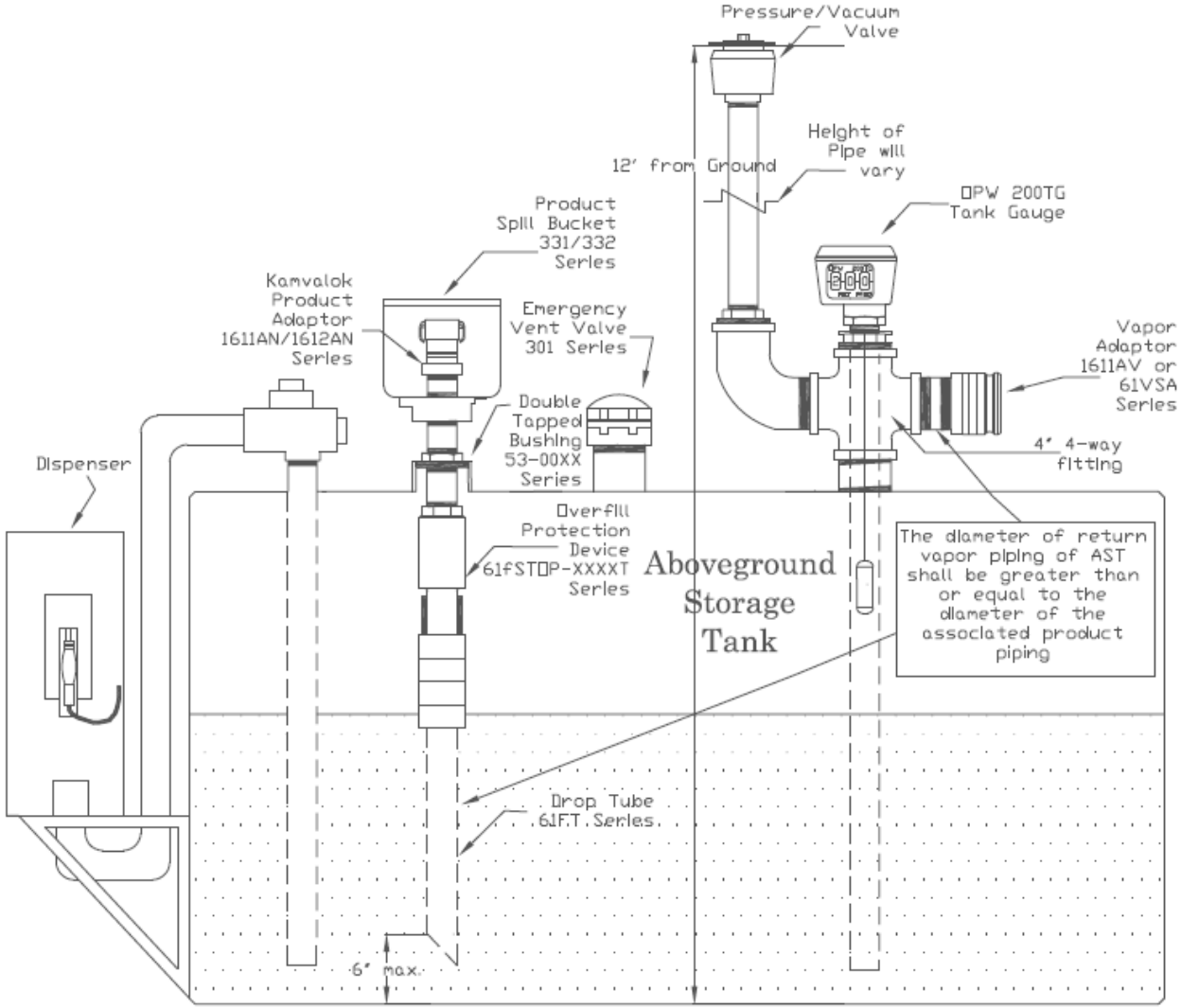
Note: For Figure 5A, tank gauging may be accomplished by way of a dedicated port (shown), mechanical gauge, or electronic gauge.

Figure 5B
Alternate Phase I Installation Configurations for Existing Aboveground Storage Tanks



Note: For Figure 5B, tank gauging may be done by way of a dedicated port (shown), mechanical gauge, or electronic gauge.

Figure 5C
Alternate Phase I Installation Configurations for Existing Aboveground Storage Tanks



Note: For Figure 5C, tank gauging may be accomplished by way of a mechanical (shown) or electronic gauge.