

**State of California
AIR RESOURCES BOARD**

EXECUTIVE ORDER VR-501-B

Relating to Certification of Vapor Recovery Systems

**Balance Phase II Enhanced Vapor Recovery (EVR) System
for Protected Aboveground Storage Tanks (AST) with
Remote Dispensing**

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 motor vehicle fueling operations (Phase II EVR System) in its Certification Procedure for Vapor Recovery Systems at Gasoline Dispensing Facilities Using Aboveground Storage Tanks (CP-206) as last amended April 23, 2015, incorporated by reference in Title 17, California Code of Regulations, Section 94016;

WHEREAS, ARB has established, pursuant to California Health and Safety Code Sections 39600, 39601, 39607, and 41954, test procedures for determining the compliance of Phase II vapor recovery systems with emission standards;

WHEREAS, Vapor Systems Technologies (VST), Inc. requested an amendment of the Balance Phase II EVR System for Protected ASTs with Remote Dispensing (Balance Phase II EVR System) to include VST's EVR balanced nozzle (Model VST-EVR-NB (G2)), coaxial curb hose (Model VDV-EVR Series), coaxial whip hose (Model VSTA-EVR Series), and breakaway coupling (Model VSTA-EVR-SBK);

WHEREAS, CP-206 provides that the ARB Executive Officer shall issue an Executive Order if he or she determines that the vapor recovery system conforms to all of the applicable requirements set forth in CP-206; and

WHEREAS, I, Richard W. Corey, Executive Officer, find that the Balance Phase II EVR System for Protected ASTs, as amended to include the components listed above, conforms with all requirements set forth in CP-206, including compatibility when fueling vehicles equipped with onboard refueling vapor recovery systems, and results in a vapor recovery system which is at least 95 percent efficient and shall not exceed 0.38 pounds of hydrocarbons per 1,000 gallons of gasoline dispensed when tested pursuant to TP-201.2, Efficiency and Emission Factor for Phase II Systems (July 26, 2012).

NOW, THEREFORE, IT IS HEREBY ORDERED that the Balance Phase II EVR System for Protected ASTs is certified to be at least 95 percent efficient and does not exceed 0.38 pounds of hydrocarbon per 1,000 gallons of gasoline dispensed in attended and/or self-service mode when used with an ARB-certified Phase I vapor recovery system and installed, operated, and maintained as specified herein and in the following exhibits. Exhibit 1 contains a list of the equipment certified for use with the Balance Phase II EVR System for Protected ASTs. Exhibit 2 contains the performance standards, specifications, and typical installation

drawings applicable to the Balance Phase II EVR System as installed in a protected AST gasoline dispensing facility (GDF). Exhibit 3 contains the manufacturing performance specifications and warranties. Exhibit 4 contains a test procedure for determination of static pressure performance of vapor recovery systems at gasoline dispensing facilities with ASTs. Exhibit 5 is the liquid removal test procedure. Exhibit 6 provides items required in conducting TP-201.4. Exhibit 7 is the nozzle bag test procedure. Exhibit 8 is the Hirt VCS 100-2 VaporTek[®] Processor operability test procedure. Exhibit 9 is the Liquid Condensate Trap compliance test procedure.

IT IS FURTHER ORDERED that compliance with the applicable certification requirements, rules and regulations of the Division of Measurement Standards of the Department of Food and Agriculture, the Office of the State Fire Marshal of the Department of Forestry and Fire Protection, and the Division of Occupational Safety and Health of the Department of Industrial Relations are made conditions of this certification.

IT IS FURTHER ORDERED that each component manufacturer listed in Exhibit 1 shall provide a warranty for that manufacturer's vapor recovery component(s) listed in Exhibit 1 to the initial purchaser. The warranty shall automatically transfer to each subsequent purchaser within the warranty period. The warranty shall require continued compliance with all applicable performance standards and specifications and shall comply with all warranty requirements in Section 17.5 of CP-206. Manufacturers may specify that the warranty is contingent upon the use of trained installers. The manufacturer warranty tag, included with each component, shall be provided to the service station owner/operator at the time of installation.

IT IS FURTHER ORDERED that every certified component manufactured by EMCO Wheaton Retail (EMCO), Veyance Technologies, Inc. (Veyance), Hirt, and VST shall meet the manufacturing performance specifications as provided in Exhibit 3.

IT IS FURTHER ORDERED that the certified Balance Phase II EVR System for Protected ASTs shall be installed, operated, and maintained in accordance with the ARB Approved Installation, Operation, and Maintenance Manual. Equipment shall be inspected weekly and annually per the procedures identified in the ARB Approved Installation, Operation, and Maintenance Manual. A copy of the Executive Order and the ARB Approved Installation, Operation and Maintenance Manual shall be maintained at each GDF where a certified Balance Phase II EVR System for Protected ASTs is installed.

IT IS FURTHER ORDERED that equipment listed in Exhibit 1, unless exempted, shall be clearly identified by a permanent identification showing the manufacturer's name, model number, and serial number.

IT IS FURTHER ORDERED that any alteration in the equipment parts, design, installation, or operation of the system provided in the manufacturer's certification application or documents and certified hereby is prohibited and deemed inconsistent with this certification unless the alteration has been submitted in writing pursuant to the process for Executive Order amendments set forth in Section 19 of CP-206 and approved in writing by the Executive

Officer or his delegate. Any sale, offer for sale, or installation of any system or component without ARB's approval as set forth above is subject to enforcement action.

IT IS FURTHER ORDERED that the following requirements are made a condition of certification. The owner or operator of the Balance Phase II EVR System for Protected ASTs shall conduct and pass the following tests no later than 60 days after startup and at least once in each twelve month period thereafter (or within a shorter time period if so specified by the District), using the following test procedures.

- TP-201.4, Dynamic Back Pressure (July 3, 2002) in accordance with the condition listed in item 1 of the Vapor Collection section of Exhibit 2;
- Exhibit 4, Determination of Static Pressure Performance of Vapor Recovery Systems at Gasoline Dispensing Facilities with Aboveground Storage Tanks;
- Exhibit 5, Liquid Removal Test Procedure;
- Exhibit 6, Required Items for Conducting TP-201.4;
- Exhibit 8, Hirt VCS 100-2 VaporTek[®] Processor Operability Test Procedure; and
- Exhibit 9, Liquid Condensate Trap Compliance Test Procedure (if a Liquid Condensate Trap is installed).

Districts may specify the sequence of the above tests. Notification of testing, and submittal of test results, shall be done in accordance with District requirements and pursuant to policies established by that District. Districts may require the use of alternate test form(s), provided they include the same minimum parameters identified in the datasheet(s) referenced in the test procedure(s). Alternative test procedures, including the most recent versions of the test procedures listed above, may be used if it is determined in writing by the ARB Executive Officer or his delegate that the alternative test procedure(s) yield equivalent results to the test procedures described above.

IT IS FURTHER ORDERED that the following requirements are made a condition of certification. The owner or operator of the Balance Phase II EVR System for Protected ASTs shall conduct, and pass, the following test no later than 60 days after startup using the following test procedure: Exhibit 7, Nozzle Bag Test Procedure. Notification of testing, and submittal of test results, shall be done in accordance with District requirements and pursuant to the policies established by that District. Alternative test procedures, including most recent versions of the test procedures listed above, may be used if determined by ARB Executive Officer or his delegate, in writing, to yield equivalent results.

IT IS FURTHER ORDERED that, except as provided above, Districts at their discretion will specify the testing, related sequencing, and testing frequency of the nozzle vapor valves. If the District requires the nozzle vapor valve be tested, the test shall be conducted in accordance with Exhibit 7, Nozzle Bag Test Procedure.

IT IS FURTHER ORDERED that the Balance Phase II EVR System for Protected ASTs shall be compatible with gasoline in common use in California at the time of certification. The Balance Phase II EVR System for Protected ASTs is not compatible with gasoline that has a methanol content greater than five percent or an ethanol content greater than ten percent.

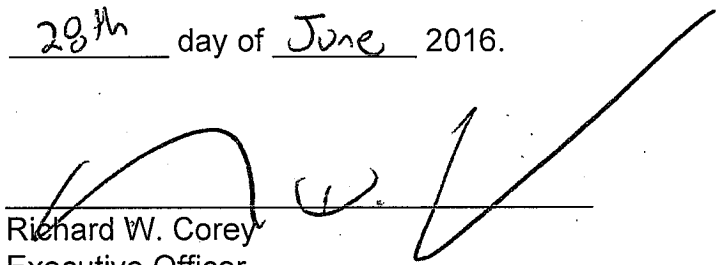
Any modifications to comply with future California gasoline requirements shall be submitted in writing pursuant to the process for Executive Order amendments set forth in Section 19 of CP-206 and approved in writing by the Executive Officer or his delegate

IT IS FURTHER ORDERED that the certification of the Balance Phase II EVR System is valid through March 13, 2019.

IT IS FURTHER ORDERED that Executive Order VR-501-A issued on March 13, 2015, is hereby superseded by this Executive Order. Balance Phase II EVR Systems for Protected ASTs certified under Executive Order VR-501-A may remain in use at existing installations up to four years after the expiration date of this Executive Order when the certification is not renewed.

IT IS FURTHER ORDERED that this Executive Order shall apply to new installations or major modification of Phase II EVR Systems at GDFs with protected ASTs and remote dispensing.

Executed at Sacramento, California, this 20th day of June 2016.



Richard W. Corey
Executive Officer

Attachments: See Next Page.

Attachments

General Requirements

- Exhibit 1 Equipment List
- Hanging Hardware
 - Hirt Thermal Oxidizer Processor Equipment List
 - Liquid Condensate Trap Equipment List (if a Liquid Condensate Trap is Installed)
- Exhibit 2 System Specifications
- Hanging Hardware
 - Processor
 - Pressure/Vacuum Vent Valves for Storage Tank Vents
 - Warranty
 - Vapor Recovery Piping Configurations
 - Dispensers
 - Liquid Condensate Traps
 - Standing Loss Control
 - Phase I System
 - Maintenance Records
 - Vapor Recovery Equipment Defects
- Exhibit 3 Manufacturing Performance Specifications and Warranties
- EMCO Wheaton Retail Manufacturing Performance Specifications and Warranty
 - VST Manufacturing Performance Specifications and Warranty
 - Veyance Manufacturing Performance Specifications and Warranty
 - Hirt Manufacturing Performance Specifications and Warranty

General Compliance Procedures

- Exhibit 4 Determination of Static Pressure Performance of Vapor Recovery Systems at Gasoline Dispensing Facilities with Aboveground Storage Tanks
- Exhibit 5 Liquid Removal Test Procedure
- Exhibit 6 Required Items for Conducting TP-201.4
- Exhibit 7 Nozzle Bag Test Procedure

Processor Specific Compliance Procedures

- Exhibit 8 Hirt VCS 100-2 VaporTek[®] Processor with Indicator Panel Operability Test Procedure

LCT Specific Compliance Procedure

- Exhibit 9 Liquid Condensate Trap Compliance Test Procedure

EXHIBIT 1¹
Equipment List

Hanging Hardware

Component	Manufacturer / Model
Nozzle	EMCO Models A4005EVR, RA4005EVR (Rebuilt) Or VST Model VST-EVR-NB (G2), VST-EVR-NB (G2 Rebuilt) (Figure 1A-1)
Coaxial Curb Hose	Veyance Model Model Maxxim Premier Plus (“NV” stamped on nozzle end) Or VST Model VDV-EVR Series (Figure 1A-2)
Coaxial Whip Hose	Veyance Model Maxxim Premier Plus Or VST Model VSTA-EVR Series (Figure 1A-2)
Breakaway Coupling	EMCO Model A4119EVR Or VSTA-EVR-SBK (Reattachable)

**Hirt - Thermal Oxidizer
Processor Equipment List**

Component	Manufacturer / Model
Hirt Thermal Oxidizer With Indicator Panel	Hirt Model VCS 100-2 VaporTek [®] Processor (Figure 1A-3) Leg Attachments: 5” – M39 48”- M40
Hirt 1/4" Check Valve (optional component)	Hirt P65

¹ The local air district may require a permit application when changing between alternate components.

**Liquid Condensate Trap
Equipment List
(If a Liquid Condensate Trap is Installed)**

Component	Manufacturer / Model
Riser Adapter	INCON model TSP-K2A (Figure 1A-4)
In-Line Filter	140 micron, Swagelok B-4F2-140 or SS-4F2-140, or equivalent (Figure 1A-4)
Screen	Aluminum Insect screen (18X14 mesh), or Stainless Steel Insect screen (18X18 mesh). (Figure 1A-4)
Stainless Steel Hose Clamp	Sized to secure screen to suction tube. (Figure 1A-4)
Liquid Sensor²	Must have an audible and visual alarm (Figure 1A-4)
Liquid Condensate Trap	Any capacity, manufacturer, make and model (Figure 1A-4)

² Must meet applicable State Water Resources Control Board (SWRCB) requirements (e.g. LG-113)

Figure 1A-1
EMCO Model A4005EVR Nozzle

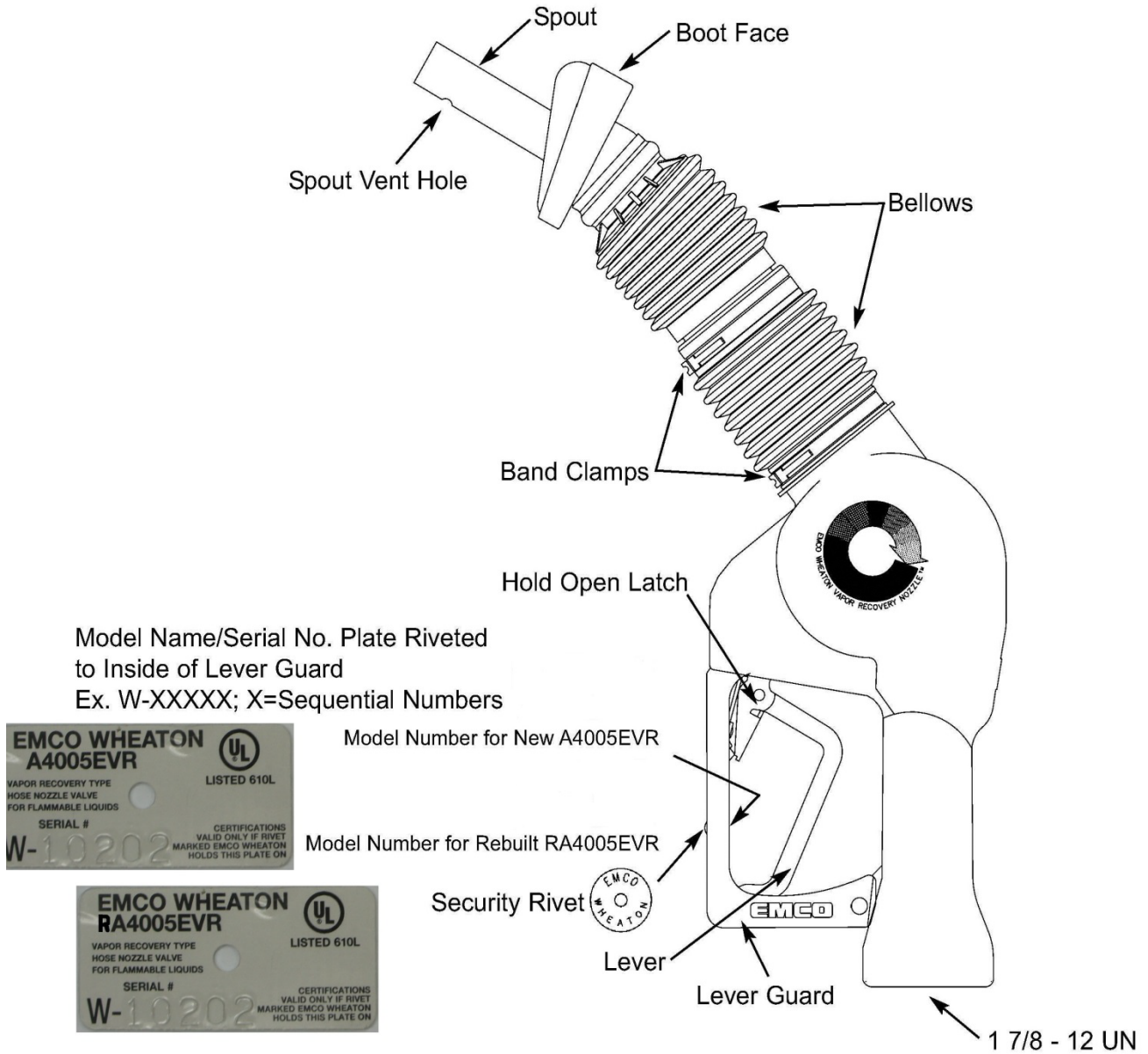


Figure 1A-1 (continued)
VST Model VST-EVR- NB (G2) Nozzle

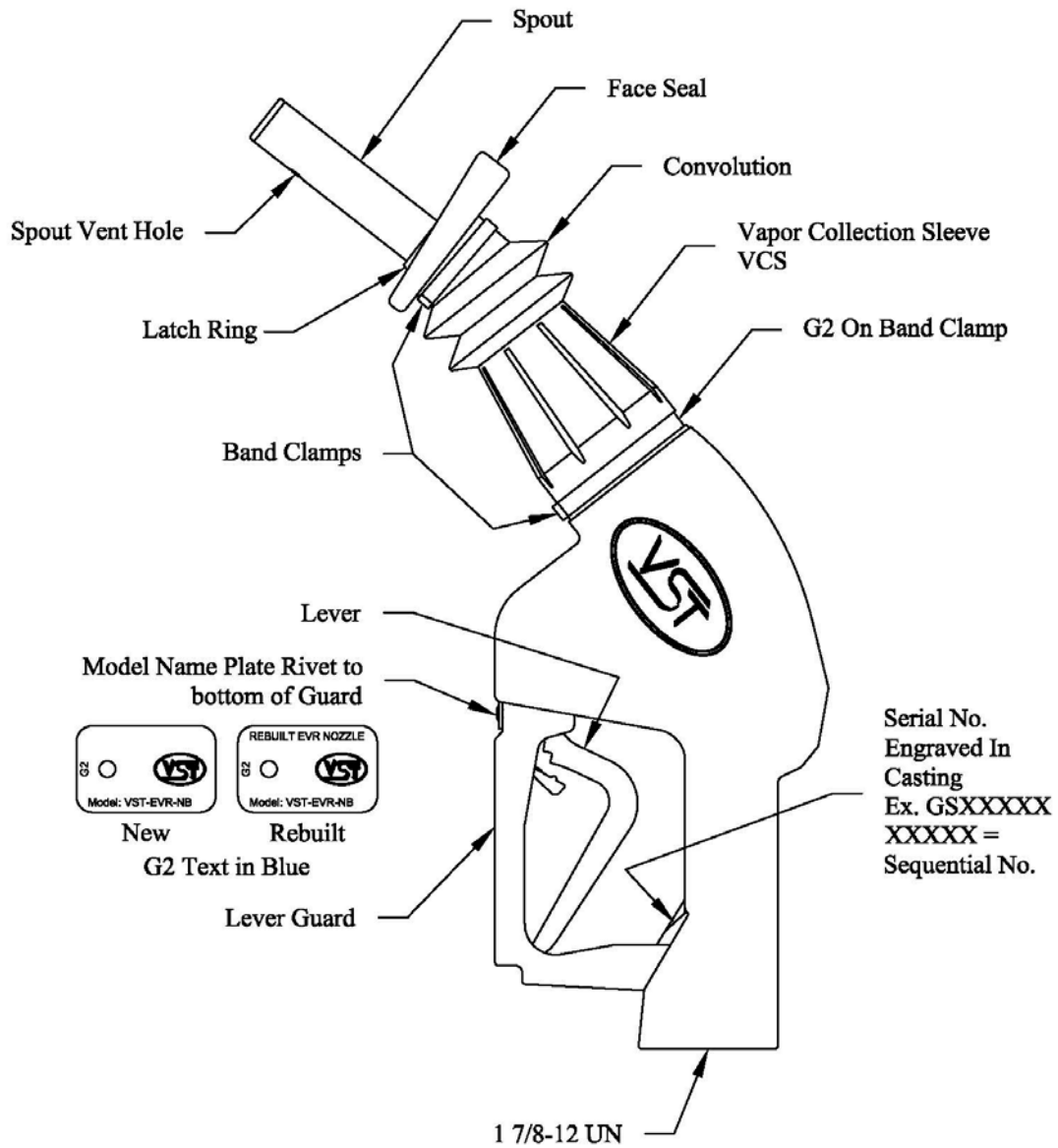


Figure 1A-2
EMCO Hanging Hardware
(Nozzle and Safe Break Valve)

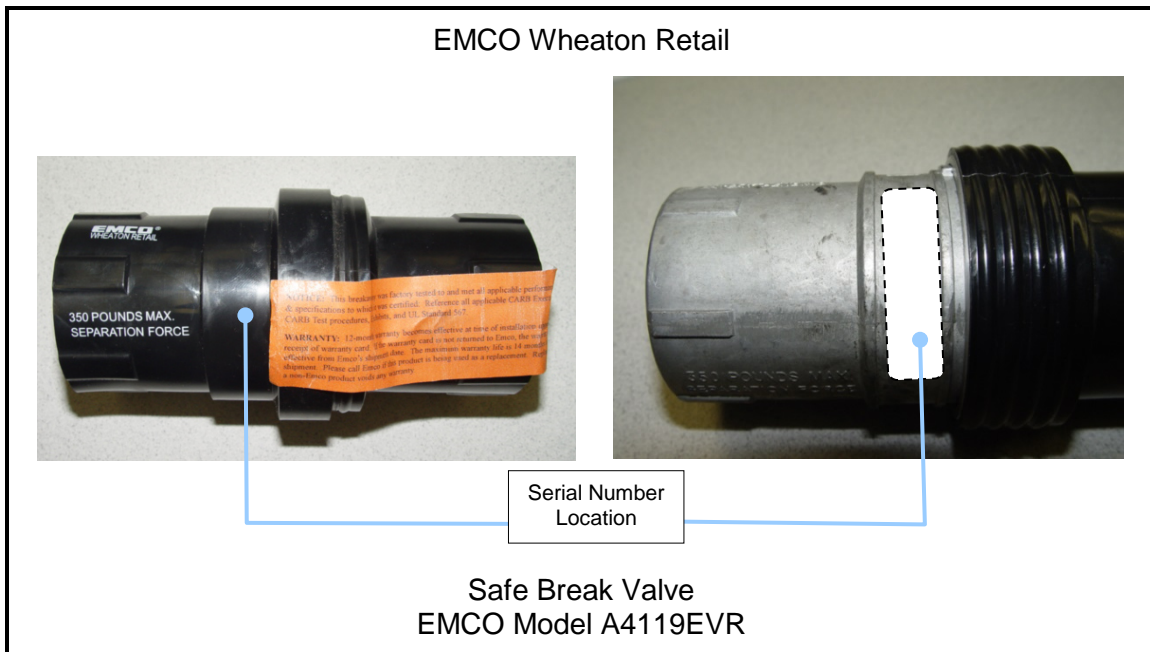
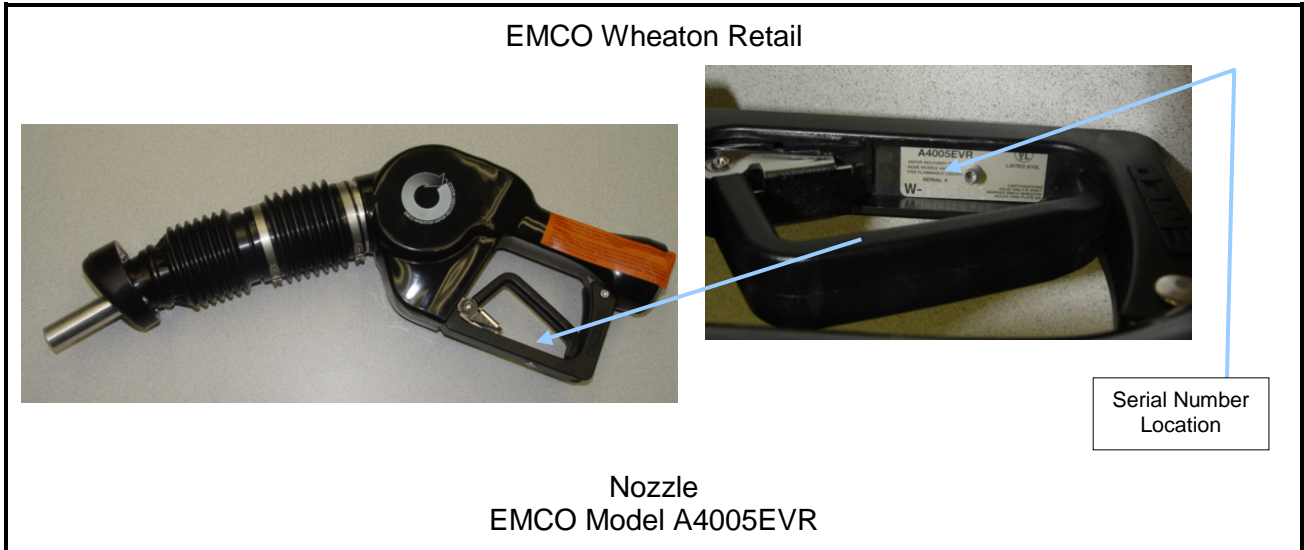


Figure 1A-2 (continued)
VST Hanging Hardware
(Nozzle and Breakaway Coupling)



Figure 1A-2 (continued)
VST Hanging Hardware
(Coaxial Curb Hose and Coaxial Whip Hose)

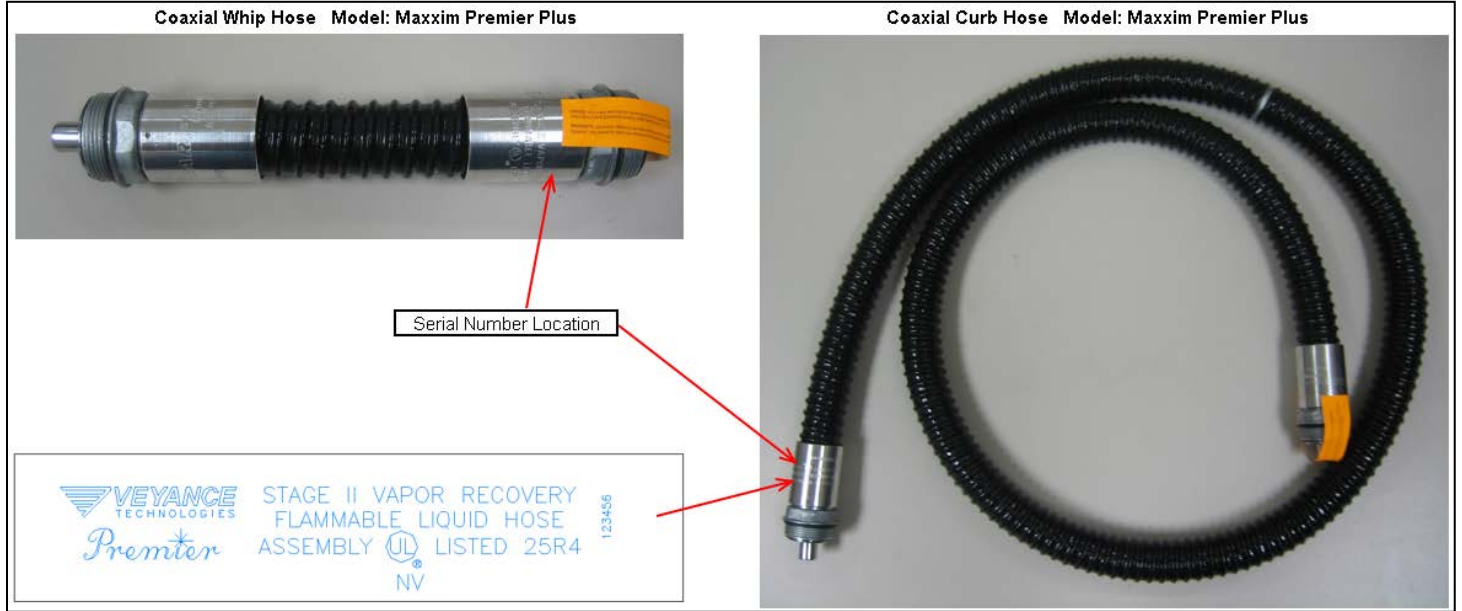
Alternate Curb Hose
Ferrule Sleeve
Identification



Alternate Whip Hose
Ferrule Sleeve
Identification



Figure 1A-2 (continued)
Veyance Technologies Hanging Hardware
(Coaxial Curb Hose and Coaxial Whip Hose)



NOTE:
6 digit serial number shown for demonstration only – actual serial number will be different

Figure 1A-3
Hirt VCS 100-2 VaporTek® Thermal Oxidizer and Indicator Panel

VCS 100-2 VaporTek® Identification Plate

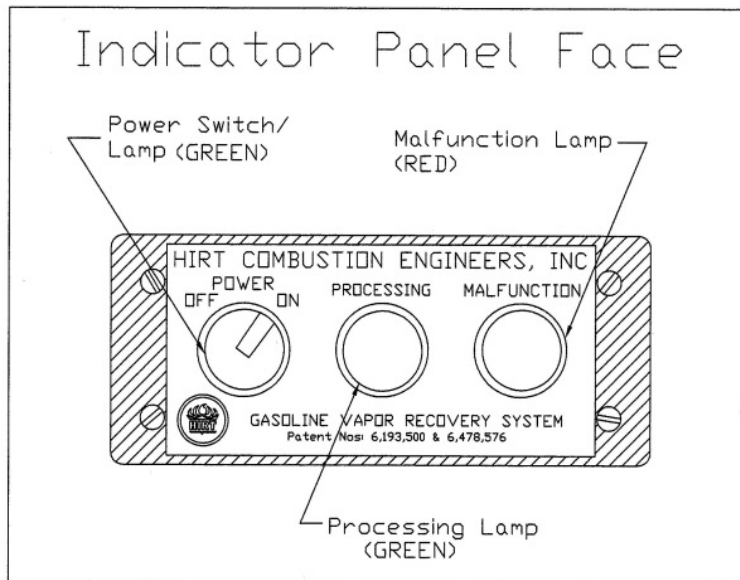
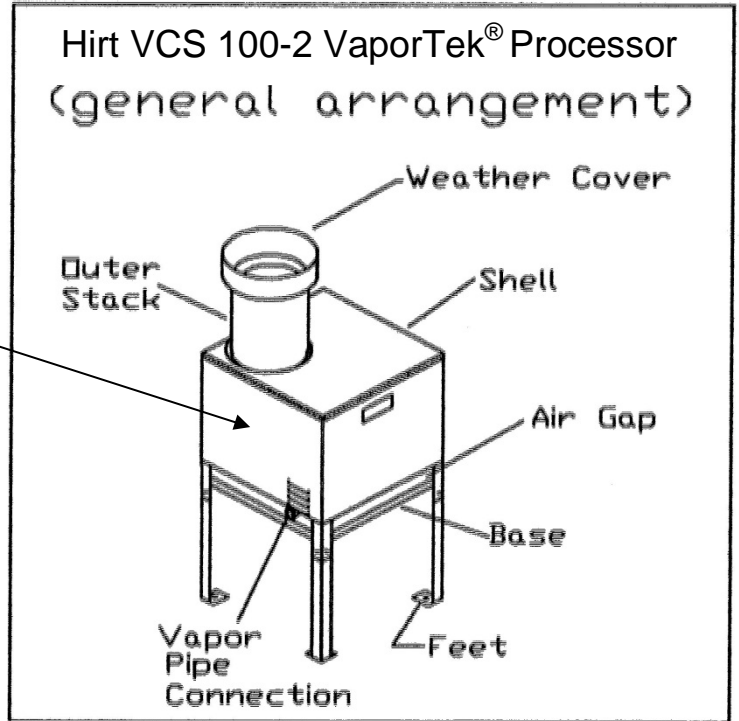
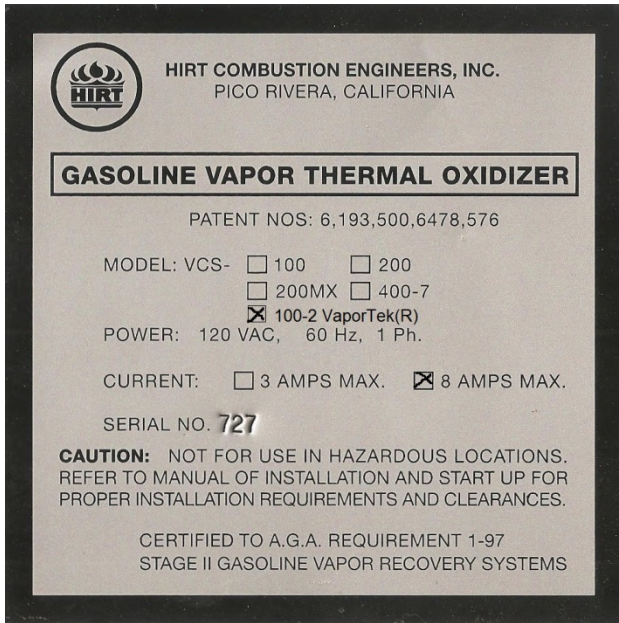


Figure 1A-3 (continued)
Typical Hirt VCS 100-2 VaporTek® Thermal Oxidizer Processor

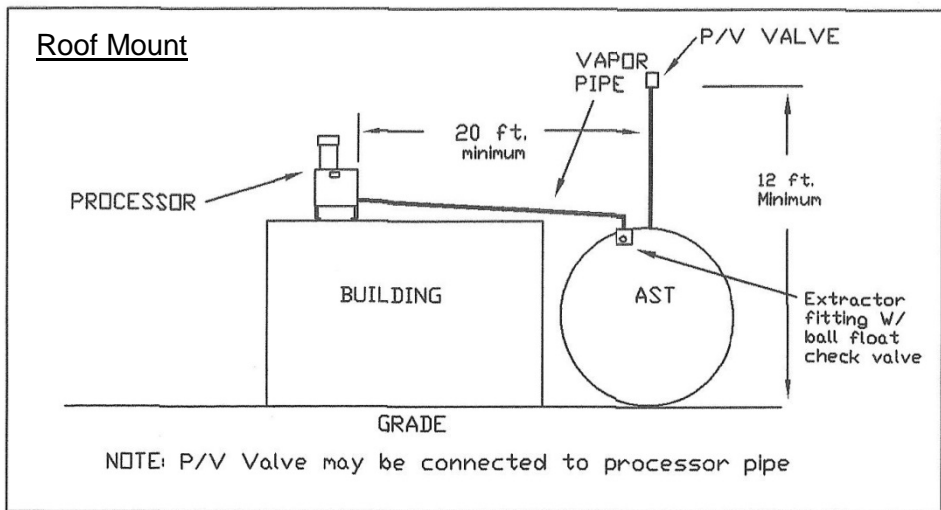
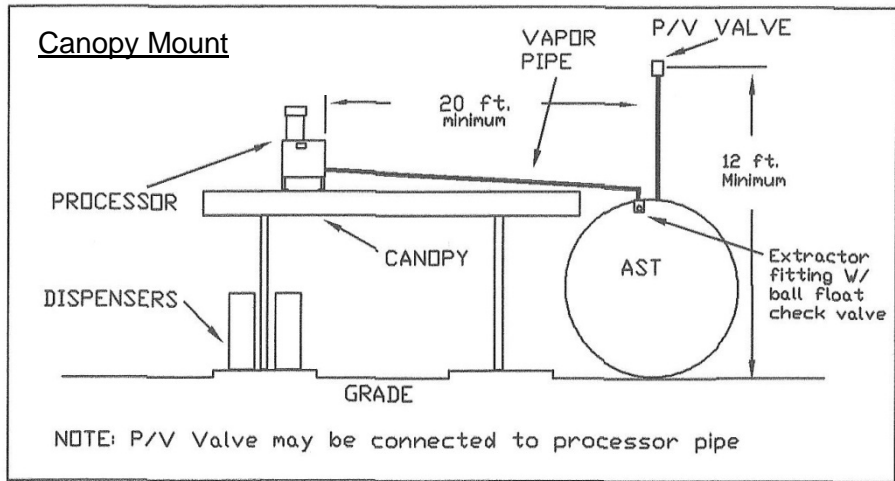
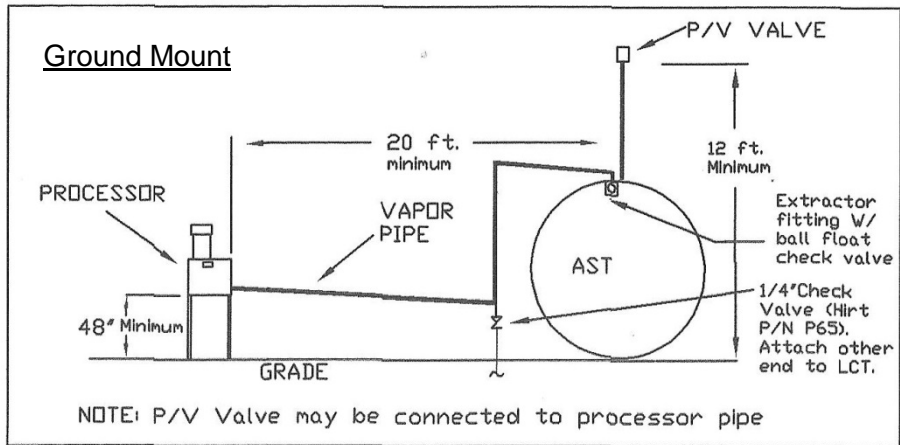


Figure 1A-4
Example Layout of a Liquid Condensate Trap Installed in an AST System

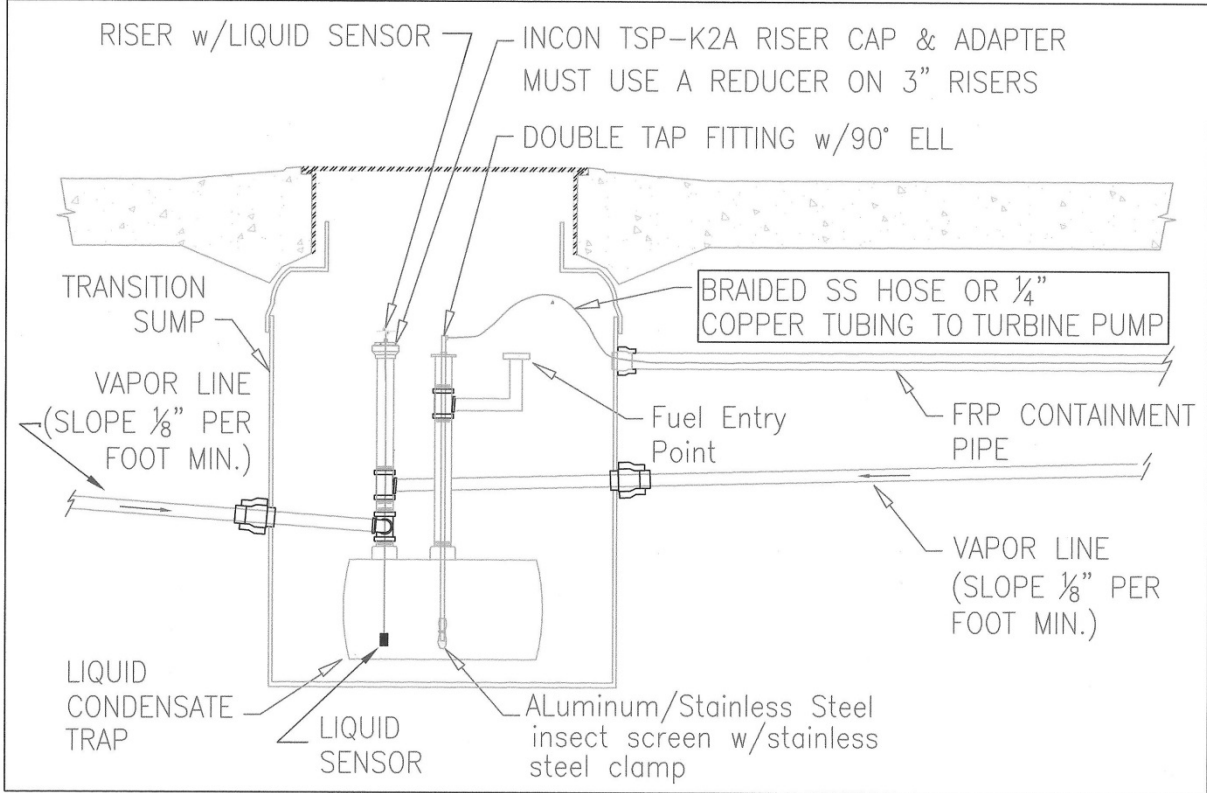


EXHIBIT 2 System Specifications

This exhibit contains the installation, maintenance and compliance standards and specifications that apply to the Balance Phase II EVR Systems installed at gasoline dispensing facilities (GDFs). All components must be installed, maintained, and operated in accordance with the specifications in the ARB Approved Installation, Operation and Maintenance Manual (IOM). Installation, maintenance and repair of system components, including removal and installation of such components in the course of any required tests, shall be performed by technicians certified by the appropriate manufacturer unless otherwise specified in the IOM. Additional certifications may be required in accordance with local District requirements.

Hanging Hardware

Nozzle

1. A vapor collection bellows shall be installed on the EMCO nozzle at the base of the spout, as shown in Figure 2B-1. A vapor collection sleeve shall be installed on the VST nozzle at the base of the spout, as shown in Figure 2B-2.
2. The EMCO Model A4005EVR and VST Model VST-EVR-NB (G2) nozzles have an integral vapor valve which prevents the loss of vapor from the underground storage tanks, ensures proper operation of the system and prevents the ingestion of air into the system. The performance of the nozzle vapor valve can be determined by items 2.1 or 2.2.
 - 2.1. The maximum allowable leak rate for the nozzle vapor path, as determined by TP-201.2B, shall not exceed 0.07 cubic feet per hour (CFH) at a pressure of two inches water column (2.00" WC)
 - 2.2. Verification of the integrity of the vapor valve can be performed on installed nozzles using the nozzle bag test procedure in Exhibit 7.
3. The gasoline flow rate of the nozzle shall be between six (6.0) and ten (10.0) gallons per minute as determined by the applicable provisions of section 6 or 7 of Exhibit 5 or by direct observation for 30 seconds minimum at the maximum hand held position.

Vapor Collection

1. The system pressure drop from the nozzle to the AST, as determined by TP-201.4 (Methodology 1) and Exhibit 6, shall not exceed the following:

0.35 inches WC at a flow rate of 60 CFH of Nitrogen; and
0.62 inches WC at a flow rate of 80 CFH of Nitrogen.

Coaxial Hoses

1. The maximum length of the hose assembly, including hose adaptor, whip hose, breakaway, and coaxial hose, measured at the base of the nozzle, shall be no more than eighteen (18) feet.
2. The liquid removal rate shall not be less than five milliliters per gallon (5.0 ml/gal) as determined by Exhibit 5 when tested with a gasoline flow rate between six (6.0) and ten (10.0) gallons per minute. Liquid removal requirement is applicable to all grades of gasoline.
3. All hoses shall have a permanent marking indicating the liquid pick-up location.
4. Any hose configuration is allowed when installed in accordance with IOM section 8.

Breakaway Couplings

1. The EMCO safe break couplings, Model A4119EVR, are non-reconnecting and shall be replaced following a drive-off.
2. The VST breakaways, Model VSTA-EVR-SBK (Reattachable), can be reconnected following a drive-off after conducting a visual and functional assessment per the drive-off procedure.

Flow Limiter

No flow limiter is allowed for this system.

Processor

Hirt VCS 100-2 VaporTek® Thermal Oxidizer

1. The processor vapor integrity shall demonstrate compliance with the static pressure decay criteria of TP-206.3 and Exhibit 4.
2. Unless there is maintenance or testing being conducted on the processor, the processor shall be on (power lamp is lit). The ball valve on the inlet of the processor shall be locked in the open position shown in Figure 2B-3 and the 3-Way Valve handle shall be pointing down in the Normal Operating Position (Opened to AST Ullage) shown in Figure 2B-4 during normal processor operation. The handles of the ball valves shall not be removed.
3. The processor shall be installed a minimum horizontal distance of 20 feet from the pressure/vacuum vent valve(s) and any fuel transfer point (i.e. nozzles or storage tank drop tubes) and the associated piping shall be sloped 1/8" per foot minimum toward the vent line(s), tank fitting, or low point which drains to the LCT (if an LCT is installed).

4. The VCS 100-2 VaporTek® Indicator Panel shall be installed at a location that is most likely to be occupied by the station attendant during normal station operation (e.g., cash register). If the site does not have an attendant, the GDF owner/operator or designee shall inform the district of the method selected for alarm notification. The district may require that such notification be on a 24/7 basis.
5. The processor shall activate when the processor is exposed to an atmospheric pressure input and the Processing lamp at the Indicator Panel shall light within three (3) minutes as determined by Exhibit 8.
6. When the processor is exposed to an atmospheric pressure input, the MALFUNCTION lamp at the Indicator Panel shall light within sixty two (62) minutes as determined by Exhibit 8.
7. If the MALFUNCTION lamp lights, the system is not in proper working order. The GDF owner/operator shall immediately take the following actions:
 - a. record the date and time the MALFUNCTION lamp lit in the station's maintenance and alarm records;
 - b. investigate the cause of the MALFUNCTION light as provided by section 10 of the Installation, Operations, and Maintenance Manual. Record results of inspections, maintenance, and/or testing conducted in the station's maintenance and alarm records; and if necessary,
 - c. record the date and time when the GDF owner/operator called the maintenance contractor for service.

Pressure/Vacuum Vent Valves for Storage Tank Vents

1. All P/V vent valves shall be an ARB certified P/V valve for a Phase I system.
2. At least one pressure/vacuum (P/V) vent valve shall be installed on each tank vent. The maximum number of P/V vent valves allowed and P/V vent valve performance specifications are listed in the applicable Phase I EVR Executive Order. Vent lines may be manifold to minimize the number of P/V vent valves and potential leak sources, provided the manifold conforms to all applicable fire regulations.

Warranty

Each manufacturer listed in Exhibit 1 shall include a warranty tag with the certified component(s). The manufacturer warranty tag, included with each component, shall be provided to the service station owner/operator at the time of installation.

Vapor Recovery Piping Configurations

NOTE: Vapor Return Piping shall meet the requirements specified in section 5.12 of CP-206.

1. Vapor Return and Vent Lines

For facilities installed after January 1, 2009, all vapor return and vent lines shall be a minimum nominal internal diameter of 2 inches from the dispensers or the vent stacks to the first manifold. All lines after the first manifold and back to the aboveground storage tank shall have a minimum nominal internal diameter of 3 inches.

Note: Facilities permitted by a local district prior to January 1, 2009 shall be required to meet the three inch diameter standard only upon facility modification which involves the addition, replacement, or removal of 50 percent or more of the buried vapor piping.

2. All vapor return lines shall have a minimum slope of 1/8 inch per foot from the dispenser riser to the riser of the LCT (if an LCT is installed). A slope of 1/4 inch or more per foot is recommended wherever feasible.

3. The vapor return piping from any fueling point to the aboveground storage tank shall be free of liquid or fixed blockage.

4. The dispenser shall be connected to the riser with either flexible or rigid material that is listed for use with gasoline. The dispenser-to-riser connection shall be installed so that any liquid in the lines will drain toward the LCT (if an LCT is installed). The internal diameter of the connector, including all fittings, shall not be less than one inch (1").

Note: The dispenser-to-riser connection is defined as the piping connection between the dispenser piping and the inlet of the dispenser riser. A vapor shear valve may also be part of the riser connection.

5. There is no length restriction for the vapor return piping of the system as long as the system complies with the maximum pressure drop requirement, item 1 of the Vapor Collection section.

6. No product shall be dispensed from any fueling point at a GDF installed with the Balance Phase II EVR System if there is a vapor line that is disconnected and open to the atmosphere.

7. Bulk Plant Operations are not allowed with this system.

Dispensers

1. The dispenser vapor piping must be sized adequately to meet the maximum pressure drop requirement, item 1 of the Vapor Collection section.
2. Dispenser vapor piping shall be installed so that any liquid in the lines will drain toward the dispenser riser.

Liquid Condensate Traps

1. Liquid condensate trap connections and fittings 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 aboveground storage tanks is subjected to a non-zero pressure. (Note: Leak detection solution will detect leaks only when positive gauge pressure exists).
2. The Liquid Level Sensor shall alarm within five (5) minutes when tested in accordance with Exhibit 9, Liquid Condensate Trap Compliance Test Procedure.
3. The Liquid Level Sensor audible alarm shall be installed at a location that is most likely to be heard by the station attendant during normal station operation (e.g. cash register). If the site does not have an attendant, the GDF owner/operator or designee shall inform the district of the method selected for alarm notification. The district may require that such notification be on a 24/7 basis.
4. The Liquid Evacuation System shall automatically evacuate gasoline when tested in accordance with Exhibit 9, Liquid Condensate Trap Compliance Test Procedure.
5. A metal tag specifying the capacity of the Liquid Condensate Trap shall be installed and maintained as specified in the Installation, Operation, and Maintenance Manual.

Standing Loss Control

The aboveground storage tank (AST) at the GDF shall meet the Standing Loss Control requirements contained in latest version of ARB's Executive Orders VR-301 and VR-302.

Phase I System

1. The Phase I system shall be an ARB-certified system that demonstrates compliance with the static pressure decay test criteria contained in Exhibit 4.

Maintenance Records

1. Each GDF operator owner shall keep records of alarms and maintenance performed at the facility. Such records shall be maintained on site in accordance with district requirements or policies. The records shall include alarm date and time, nature of the alarm, troubleshooting, maintenance or repair performed to validate and/or correct alarms, component, or system failures, date when maintenance or repair was conducted, name and Certified Technician Identification Number of individual conducting

maintenance or test, affiliation, and telephone number. Additional information may be required in accordance with local district requirements. An example of a GDF maintenance and alarm form is shown in Figure 2B-5.

2. Maintenance shall be conducted in accordance with the Scheduled Maintenance section of the ARB approved Installation, Operation, and Maintenance Manual.

Vapor Recovery Equipment Defects

The following is deemed a defect for the affected fueling point(s) or system.

Grade Points – EMCO Nozzles

1. The grade point shall be removed from service when more than 0.4 square inches of a nozzle boot face material is missing (e.g., a triangular or similar shape in which greater than 7/16 inches of the boot face circumference is missing (accumulated)).
2. The grade point shall be removed from service when there is slit across seven (7) consecutive bellows convolutions as determined by direct measurements.
3. The grade point shall be removed from service when there is a 360 degree cut around the bellows convolution.

Grade Points – VST Nozzles

1. The grade point shall be removed from service when more than 30% of a nozzle face seal is missing (e.g., a triangular or similar shape in which greater than 2.5 inches of the faceplate circumference is missing (accumulated)).
2. The grade point shall be removed from service when more than 0.4 square inches of a nozzle vapor collection sleeve is missing (e.g., a rectangular shape of greater than nine/sixteenth (9/16) inches or more on each side, a circular shape of eleven/sixteenth (11/16) inches or more in diameter, or a triangular shape of seven/eighth (7/8) inches on the side.
3. The grade point shall be removed from service when the total slit length in the convolutions exceeds 18 inches as determined by direct measurements.

Grade Points – General

1. The grade point shall be removed from service when the dispensing rate is greater than ten (10.0) gallons per minute (gpm) or less than five (5.0) gpm as determined by the applicable provisions of section 6 or 7 of Exhibit 5 or by direct observation for 30 seconds minimum at the maximum hand held position.
2. The grade point shall be removed from service when a hose is found to have greater than 150 ml of gasoline in the vapor side as determined by sections 6.1 to 6.5 of Exhibit 5. Note: Prior to draining gasoline from the vapor side of the hose, use Emco tool P/N 494635EVR (for EMCO EVR nozzle) or VST tool P/N VST STP 100 (for VST EVR

nozzle) and plug the fuel spout. **Do not activate dispenser when draining gasoline from the vapor side of the hose.**

3. The grade point shall be removed from service when the system pressure drop exceeds the following conditions as determined by Methodology 1 of TP-201.4 and Exhibit 6:
 - 0.95 inches WC at a flow rate of 60 CFH of Nitrogen; and
 - 1.52 inches WC at a flow rate of 80 CFH of Nitrogen.
4. The grade point shall be removed from service when any hose has a visible opening as determined by direct observation.
5. The grade point shall be removed from service when any nozzle lever has spring tension (live lever) when the vapor recovery sleeve or bellows is uncompressed as determined by the weekly interlock inspection procedure per IOM Section 2.
6. The grade point shall be removed from service when the nozzle automatic liquid shut-off mechanisms malfunction in any manner as determined by EPO No. 26-F (See Vapor Recovery Equipment Defects List) or direct observation.
7. The grade point shall be removed from service when any nozzle has a defective vapor valve as determined by Exhibit 7 or when the vapor valve has a leak rate that exceeds 0.07 cubic feet per minute at a pressure of two (2) inches WC as determined by TP-201.2B.
8. The grade point or system shall be removed from service when any component required by this Executive Order is absent, installed improperly or disconnected as determined by direct observation.

System with Hirt Thermal Oxidizer

1. Unless there is maintenance or testing being conducted on the Hirt Thermal Oxidizer, the system shall be removed from service when the ball valve on the Thermal Oxidizer is not locked in the proper operating configuration (Figure 2B-3) as determined by direct observation.
2. Unless there is maintenance or testing being conducted on the Hirt Thermal Oxidizer, the system shall be removed from service when the Thermal Oxidizer Indicator Panel is not in the "power on" position (power lamp is lit).

Figure 2B-1
EMCO Model A4005EVR Nozzle

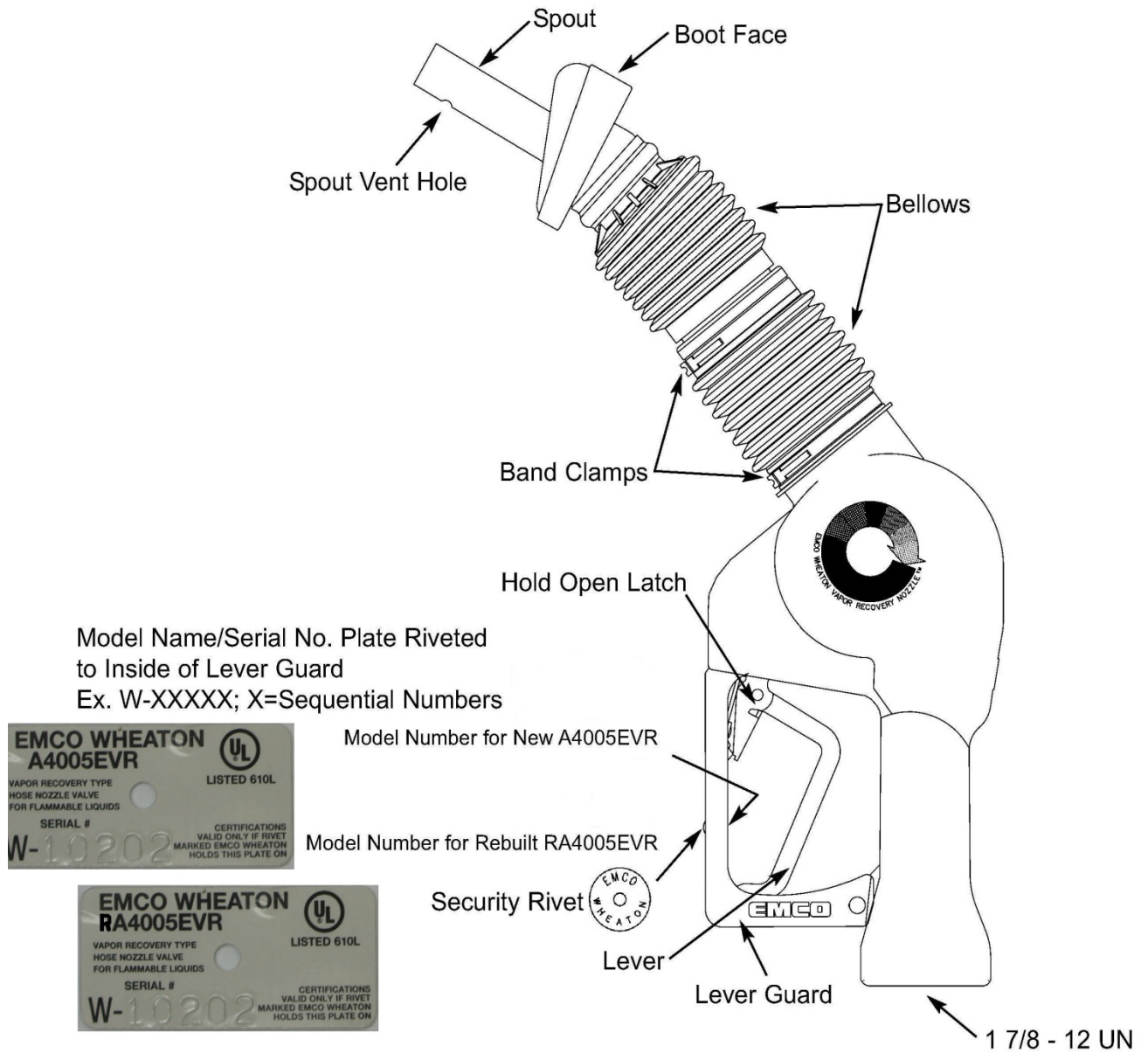


Figure 2B-2
VST Model VST-EVR-NB (G2) Nozzle

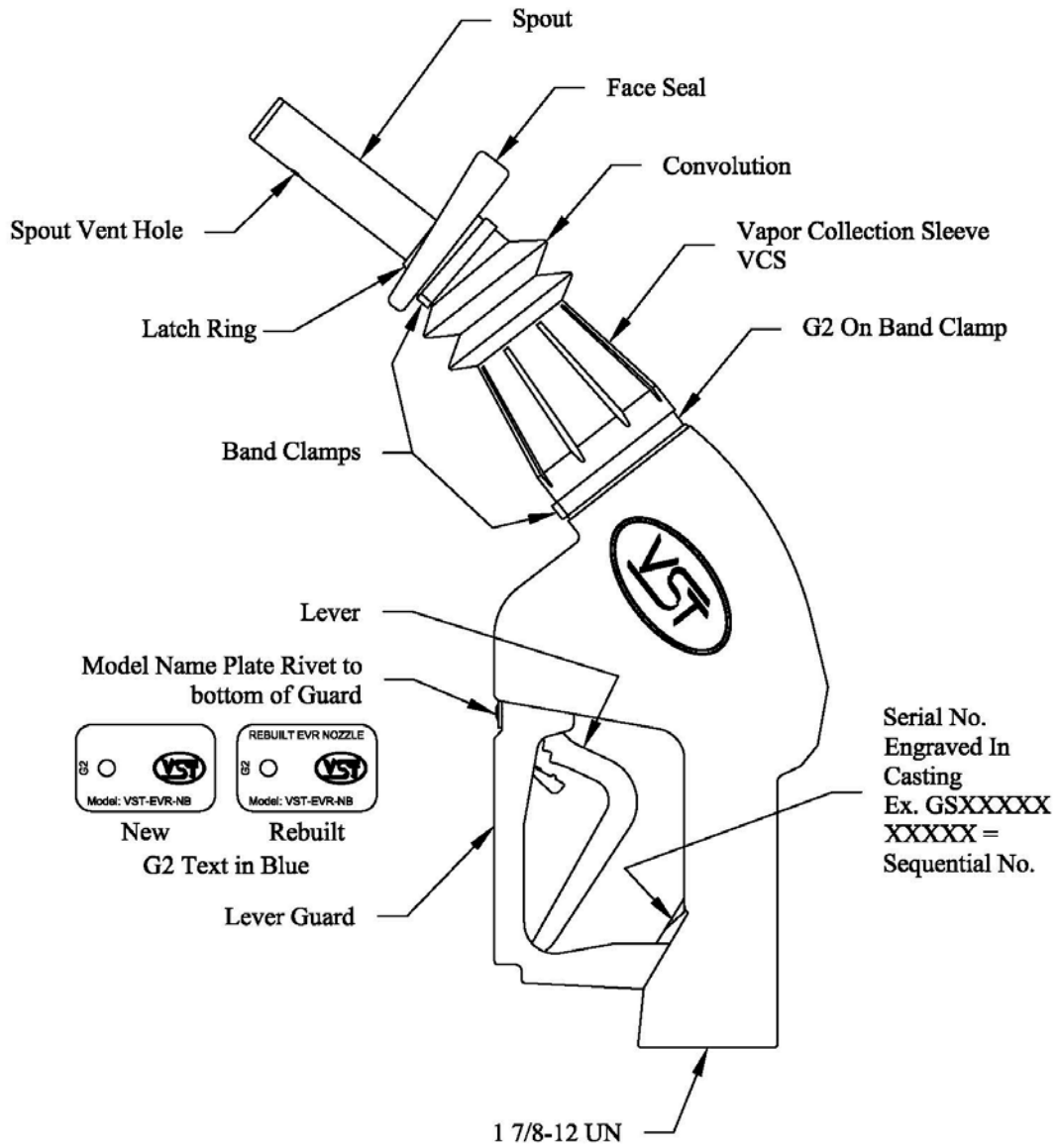


Figure 2B-3
Hirt VCS 100-2 VaporTek® Thermal Oxidizer
(shown in normal operation)

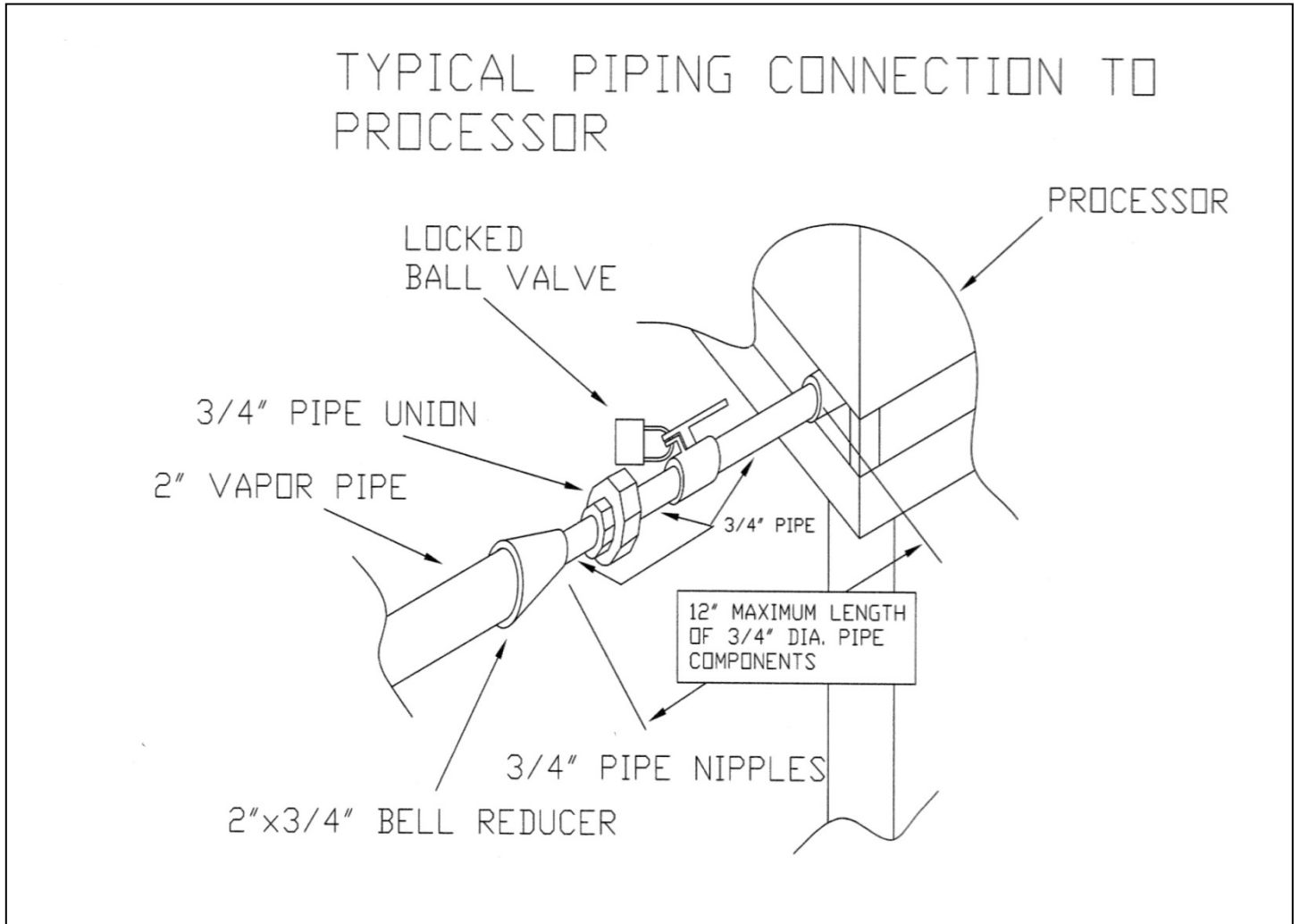


Figure 2B-4
Hirt VCS 100-2 VaporTek® Thermal Oxidizer
(3-Way Valve shown in normal operation)

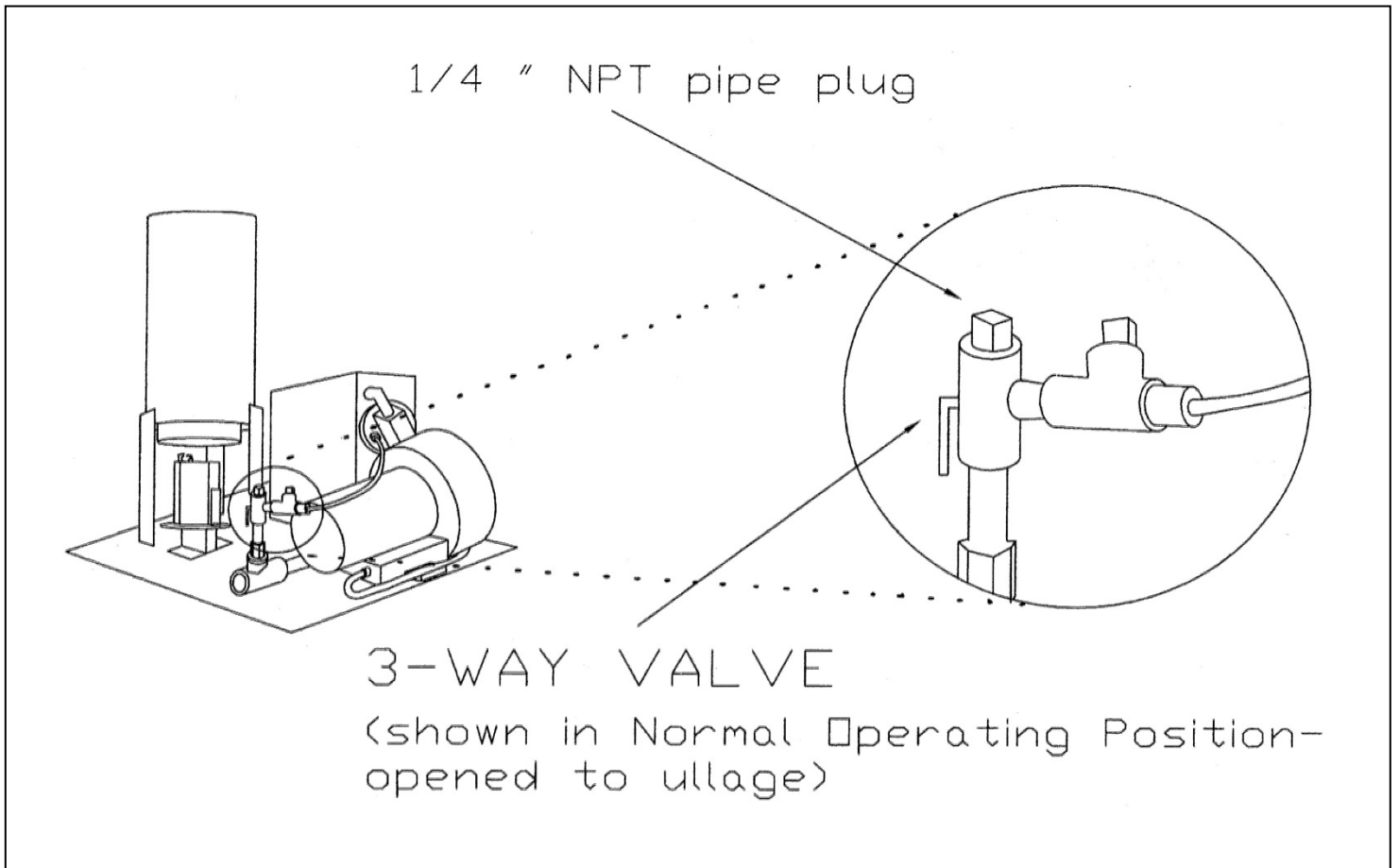


Figure 2B-5
Example of a GDF Maintenance Record and Alarm History Form

Date of Maintenance/ Test/Inspection/Failure /alarm history (including date and time of maintenance call)	Repair Date To Correct Test Failure	Maintenance/Test/Inspection Performed and Outcome/Action Taken in Response to Alarm	Affiliation	Name and Technician ID Number of Individual Conducting Maintenance or Test	Telephone Number

EXHIBIT 3

Manufacturing Performance Specifications and Warranties

The Phase II EVR Systems and all components shall be manufactured in compliance with the performance standards and specifications in CP-206 (amended November 9, 2015), as well as the requirements specified in this Executive Order. All components (Exhibit 1) 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 or Executive Officer delegate. Unless specified in Exhibit 2 or in the ARB Approved Installation, Operation and Maintenance Manual, the specifications listed below apply to the manufacturing process and are not appropriate for determining the compliance status of a gasoline dispensing facility.

This exhibit also includes the manufacturer warranties for all components listed in Exhibit 1, including replacement parts and subparts. The manufacturer warranty tag, included with each component, shall be provided to the service station owner/operator at the time of installation.

PART Ia – EMCO Wheaton Retail Manufacturing Performance Specifications

1. NOZZLES

- a. The vapor valve leak rate of every nozzle shall not exceed 0.07 cubic feet per hour (CFH) at a pressure of +2 inches water column (WC) when tested in accordance with the latest version of TP-201.2B, "Flow and Pressure Measurement of Vapor Recovery Equipment".
- b. The automatic shut off feature of every nozzle is tested at all service clip settings as well as handheld in accordance with Underwriters Laboratories (UL) Standard 842.
- c. The primary and secondary shut-off mechanism of every nozzle shall be identical to the design that passed the California Department of Food and Agriculture Division of Measurement Standards Article 2 (DMS 6-6-97).
- d. Every nozzle is manufactured to the specifications that passed all tests conducted during the ARB certification for the following:
 - TP-201.2C - Spillage from Phase II Systems
 - TP-201.2D - Post-Fueling Drips from Nozzles
 - TP-201.2E - Gasoline Liquid Retention in Nozzles and Hoses
 - TP-201.2J - Pressure Drop Bench Testing of Vapor Recovery Components
- e. The terminal end of every nozzle shall be manufactured in accordance with the specifications referenced in Section 5.7.3 of CP-201.

2. SAFE BREAK VALVES

- a. Every safe break valve is tested for continuity and pressure tests in accordance with UL Standard 567.

- b. Every safe break valve is manufactured to the standard that passed all tests conducted during the ARB certification for the following:

TP-201.2J - Pressure Drop Bench Testing of Vapor Recovery Components

PART Ib – EMCO Wheaton Retail California EVR Warranty

Emco Wheaton Retail Corporation service station products are warranted to be free from defects in material and workmanship under normal use and service. Emco Wheaton Retail Corporation warrants its California enhanced vapor recovery (EVR) components for a period of one (1) year from date of installation. The EVR components are warranted to meet the performance standards and specifications to which it was certified by the California Air Resources Board (CARB) for the duration of the warranty period. This warranty extends to the purchaser and any subsequent purchaser of the Emco Wheaton Retail components during the warranty period.

Emco Wheaton Retail Corporation shall, at its option, repair or replace that part which proves to be defective. Repaired or replacement nozzles are warranted for the balance of the original warranty period. This warranty is void unless the purchaser returns the claimed defective item to Emco Wheaton Retail Corporation for inspection to determine whether the claimed defect is covered by this warranty.

The exclusive and sole remedy under this warranty is repair or replacement of the defective part. Emco is not responsible for claims for damage caused by improper installation or maintenance; corrosive fluids; misuse of the product or use the product for other than its intended purpose; or accident, acts of God, or natural phenomena. Emco will not pay for labor or related expenses, nor shall Emco be liable for any incidental, consequential or exemplary damages. This warranty is void if the Emco Wheaton Retail Corporation product has been previously repaired with parts not approved by Emco Wheaton Retail Corporation, or if a nozzle bears the mark or imprint of a company other than Emco Wheaton Retail Corporation, indicating the nozzle has been rebuilt or repaired by a company other than Emco Wheaton Retail Corporation.

EMCO WHEATON RETAIL CORPORATION MAKES NO OTHER WARRANTIES, EXPRESS OR IMPLIED, (WHETHER WRITTEN OR ORAL), INCLUDING BUT NOT LIMITED TO ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE.

In the event a nozzle is returned to Emco Wheaton Retail Corporation within the warranty period described above, and when tested is found to be functional and without defect, Emco Wheaton Retail Corporation reserves the right to return the nozzle to the customer or apply a Core Credit (see Nozzle Core Return Program), at Emco Wheaton Retail Corporation's discretion.

In the event of failure within the warranty period, call the Customer Service Department at **(800) 234-4394**. Describe the problem and provide the product date stamp information to the customer service representative. In the case of a nozzle, provide the serial number. The customer service representative will provide a product complaint number, if applicable. Ship the defective equipment **PREPAID**, to Emco Wheaton Retail Corporation for repair or replacement.

Warranty issue is contingent upon proof of installation to establish that the product falls within the warranty period. Proof on installation shall be: 1) warranty information completed by the certified contractor (warranty card), 2) contractor invoice, 3) end-user sales receipt, or 4) copy of the appropriate log book entry from the gasoline dispensing facility. Nozzle serial number must be included on proof of installation document.

Emco Wheaton Retail Corporation products should be used in compliance with applicable federal, state and local laws and regulations. Product selection should be based on physical specifications and limitations and compatibility with the environment and material to be handled. All illustrations and specifications are based on the latest product information available at the time of publication. Emco Wheaton Retail Corporation reserves the right to make changes at any time in prices without notice or obligation. Emco Wheaton Retail Corporation reserves the right

<p>EMCO[®] WHEATON RETAIL (252) 243-0150</p> <p>Phase II EVR Warranty Tag</p> <p>Emco Wheaton Retail warrants its California enhanced vapor recovery (EVR) components for a period of one (1) year from date of installation.</p> <p>This component was factory tested to and met all applicable performance standards and specifications to which it was certified by the California Air Resources Board (ARB). The performance standards and specifications are listed in the applicable ARB Executive Orders and Certification Procedure 201.</p> <p>IMPORTANT: Leave this warranty tag with the station owner and/or operator.</p> <p>Emco Wheaton Retail Corp. 2300 Industrial Park Dr., Wilson, NC 27893 p/n 570666</p>	<p>Serial Number: _____</p> <p>Replacement Serial Number: _____</p> <p>Manufacture Date: _____</p> <p>Name of Contractor: _____</p> <p>Name of Technician: _____</p> <p>Technician Signature: _____</p> <p>Technician Certification Number: _____</p> <p>Installation Date: _____</p> <p>Installation Site: _____</p> <p>Distributor Name: _____</p> <p>Branch Location: _____</p> <p>Component: <input type="checkbox"/> A4005EVR Nozzle <input type="checkbox"/> A4110EVR Hose Swivel <input type="checkbox"/> A4119EVR Safe Break Valve</p>
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Reason for returning product: Please select appropriately.
Important: Failure to complete accurately may cause delays processing warranty claim.

<input type="checkbox"/> Does not shut-off	<input type="checkbox"/> Leaks fuel around lever and latch area
<input type="checkbox"/> Experiencing premature shut-off	<input type="checkbox"/> Causing meter creep
<input type="checkbox"/> Does not flow fuel with bellows compressed and lever engaged	<input type="checkbox"/> Bad Inlet or outlet threads
<input type="checkbox"/> Flows fuel when bellows is not compressed	<input type="checkbox"/> Fails Leak Decay Test CARB TP-201.3
<input type="checkbox"/> Leaks fuel around spout or bellows area	<input type="checkbox"/> Fails Dynamic Back Pressure Test CARB TP-201.4

Comments _____

PART IIa - VST Manufacturing Performance Specifications

1. NOZZLES

- a. The vapor valve leak rate of every nozzle shall not exceed 0.07 cubic feet per hour (CFH) at a pressure of +2 inches water column (WC) when tested in accordance with the latest version of TP-201.2B, "Flow and Pressure Measurement of Vapor Recovery Equipment".
- b. The automatic shut off feature of every nozzle is tested at all service clip settings as well as handheld in accordance with Underwriters Laboratories (UL) Standard 842.
- c. The primary and secondary shut-off mechanism of every nozzle shall be identical to the design that passed the California Department of Food and Agriculture Division of Measurement Standards Article 2 (DMS 6-6-97).
- d. Every nozzle is manufactured to the specifications that passed all tests conducted during the ARB certification for the following:
 - TP-201.2C - Spillage from Phase II Systems
 - TP-201.2D - Post-Fueling Drips from Nozzles
 - TP-201.2E - Gasoline Liquid Retention in Nozzles and Hoses
 - TP-201.2J - Pressure Drop Bench Testing of Vapor Recovery Components
- e. Every nozzle vapor collection boot is manufactured such that the force necessary to compress the nozzle bellows 0.5 inches is in the range of 10-16 pounds force.
- f. The terminal end of every nozzle shall be manufactured in accordance with the specifications referenced in Section 4.7.3 of CP-201.

2. COAXIAL HOSES

- a. Every coaxial hose is tested for continuity and pressure tests in accordance with UL Standard 330.
- b. Every coaxial hose is manufactured to the standards and specifications that passed all tests conducted during the ARB certification for the following:
 - Exhibit 5 - Liquid Removal Test Procedure
 - TP-201.2J - Pressure Drop Bench Testing of Vapor Recovery Components

3. BREAKAWAY COUPLINGS

- a. Every breakaway coupling is tested for continuity and pressure tests in accordance with UL Standard 567.
- b. Every breakaway coupling is manufactured to the standard that passed all tests conducted during the ARB certification for the following:
 - TP-201.2J - Pressure Drop Bench Testing of Vapor Recovery Components

CUSTOMER COPY

To be left at gasoline dispensing facility, GDF,
at time of installation

Manufacturing Date:

Serial Number: (Fill in at time of installation)

PART IIb – VST Warranty Statement

This limited warranty is given by Vapor Systems Technologies, Inc. (hereinafter VST) to the initial purchaser, and any subsequent purchasers of new equipment, within the warranty period of products manufactured by VST. VST products:

- Are factory tested and meet all applicable performance standards and specifications.
- Should be used in compliance with all applicable federal, state, and local laws and regulations to which they were certified.
- Are warranted to be free from defect in material and workmanship with ongoing compliance to all applicable performance standards and specifications under normal use, service, proper installation, inspections, and maintenance practices per manufacturer specifications.

VST warrants the materials and workmanship to be free from defects in accordance with the following provisions:

1. This warranty does not apply to any products that have:
 - Been subject to misuse, abuse, tampering, negligence, accident, or irreparable drive off damage.
 - Been misapplied, improperly installed, or not installed per VST's instructions and specifications.
 - Been modified, altered, rebuilt or repaired by unauthorized persons or outside the criteria of VST specifications.
 - Been improperly maintained and/or improperly inspected in accordance with the system's or product's periodic maintenance schedule, and any inspection and/or maintenance requirements imposed by the State or any government agency.
 - Been exposed to contact with fuels containing greater than 5% methanol, 10% ethanol, or 15% MTBE by volume or any exposure to M85/E85 fuel.
 - Been subject to damage resulting from acts of God.
2. This warranty does not cover and VST is not responsible or liable for:
 - Incidental, consequential and/or indirect damages or loss including, but not limited to, personal injury, death, property damage, environmental damage, cost of labor, clean-up, downtime, installation and removal, product damage, and loss of product, revenue or profits.
 - Any claims or lawsuits against the purchaser and/or distributor.
 - Labor or materials necessary to disconnect or connect the warranted product for return to VST.

VST products used on systems that have not been listed by a nationally-recognized testing laboratory (NRTL) or use that falls outside intended field of use voids all warranties.

The duration of this warranty is TWELVE (12) MONTHS from the time of installation provided timely valid proof of installation is submitted to VST. Valid proof of installation options include, but are not limited to:

- VST Product Warranty Registration Card is properly completed and returned to VST at time of installation and within (6) SIX MONTHS from the date of manufacture.

OR

- In lieu of a legitimate, completed and returned VST Product Warranty Registration Card within the first (6) SIX MONTHS from the date of manufacture, VST requires the following:
 1. A completed gasoline dispensing facility (GDF) monthly maintenance log from the month in which the VST equipment was installed and documented, **AND**
 2. One of the following documents that may be used as a reference installation date:
 - A valid distributor invoice
 - A valid contractor invoice

The above options must be clearly marked with:

- All VST product serial numbers
- Product sale date and/or installation date
- Purchaser name, address, and phone number

If valid proof of installation is not received by VST, as noted above, the warranty period is TWELVE (12) MONTHS from the VST date of manufacture.

In the event of a warranty claim:

- The purchaser/distributor must obtain a copy of a Return Goods Authorization (RGA) from VST prior to returning product so as to ensure proper processing. All warranty claim returns must be shipped freight prepaid by the purchaser and/or distributor.
- Warranty status will be determined upon inspection at VST's facility within THIRTY (30) DAYS of receipt by VST of the warranted products. All returned merchandise deemed *Not Under Warranty*, will be held by VST for SEVEN (7) BUSINESS DAYS prior to disposal. Return of this product to the purchaser/distributor will require purchaser/distributor to issue a call tag within SEVEN (7) BUSINESS DAYS of notification.
- Repair or replacement of the warranted product is the **EXCLUSIVE REMEDY** under the terms of this warranty. No other warranty exists.

VST, as to each defect, shall be relieved of all obligations and liabilities under this Limited Warranty if the products have been operated with any accessory, equipment, or a part not specifically approved by VST and the appropriate governing regulatory agencies.

THIS LIMITED WARRANTY IS EXCLUSIVE AND IS IN LIEU OF ALL OTHER WARRANTIES. VST MAKES NO OTHER WARRANTIES (WHETHER WRITTEN OR ORAL), EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO ANY IMPLIED WARRANTY OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, OR OTHERWISE, AND ANY OTHER SUCH WARRANTIES ARE HEREBY DISCLAIMED.

VST NEITHER ASSUMES NOR AUTHORIZES ANY OTHER PERSON OR ENTITY TO ASSUME FOR IT OR BIND IT TO ANY OTHER LIABILITY OR OBLIGATION RELATED TO OR IN CONNECTION WITH THIS LIMITED WARRANTY.

VST reserves the right to make changes at any time to prices and designs, or make additions or improvements with respect to its products, without incurring any obligation to modify or install same on previously manufactured products.

PART IIIa – Veyance Manufacturing Performance Specifications

1. COAXIAL HOSES

- a. Every coaxial hose is tested for continuity and pressure tests in accordance with UL Standard 330.
- b. Every coaxial hose is manufactured to the standards and specifications that passed all tests conducted during the ARB certification for the following:

- Exhibit 5 - Liquid Removal Test Procedure
- TP-201.2J - Pressure Drop Bench Testing of Vapor Recovery Components

PART IIIb – Veyance Maxxim Premier™ Plus Hose Warranty

WARRANTY FOR VAPOR RECOVERY SYSTEMS EQUIPMENT USED IN CALIFORNIA:

WARRANTY TAG


PART #: _____
 INSTALLATION DATE: _____ NAME OF INSTALLER: _____
 LOCATION: _____

This hose was factory tested to and met all applicable performance standards & specifications to which it was certified: Reference all applicable CARB Executive Orders, CARB Test Procedures, Exhibits, and UL Standard 330.

The manufacture date is represented by a 4 digit julian date code stamped on the hose fitting.
 Example: "1021" represents the 102nd day of 2011.

1. Complete warranty tag at time of installation.
2. Return warranty tag or other evidence of purchase and installation with hose for any necessary warranty claims.

WARRANTY FOR VAPOR RECOVERY SYSTEMS EQUIPMENT USED IN CALIFORNIA: Seller warrants Product(s) consisting of vapor recovery system equipment used in California ("California Vapor Recovery Product(s)") to meet the performance standards and specifications to which such Product(s) were certified by the California Air Resources Board for a period of one (1) year from the date of installation. This warranty extends to Buyer and any subsequent Buyer of the California Vapor Recovery Product(s). **SELLER MAKES NO REPRESENTATION OR WARRANTY OF ANY KIND WITH RESPECT TO PRODUCT(S), EXPRESS OR IMPLIED, EXCEPT AS EXPRESSLY PROVIDED ABOVE.**



PART IVa – Hirt Manufacturing Performance Specifications

1. HIRT VCS 100-2 VaporTek® THERMAL OXIDIZER

- a. The VCS 100-2 VaporTek® processor is subjected to an assembly quality check.
- b. The VCS 100-2 VaporTek® processor is visually inspected to verify identification, caution/warning, electrical, and other Agency labels are in place.
- c. The VCS 100-2 VaporTek® processor is subjected to vacuum and pressure leak tests.
- d. The VCS 100-2 VaporTek® processor is subjected to the following functional tests:
 - i. Power test;
 - ii. Verify set point of vacuum sensor switch;
 - iii. Verify operation of main vapor valve;
 - iv. Verify flow rate of pilot and main vapor valves; and
 - v. Dielectric test.

PART IVb –HIRT COMBUSTION ENGINEERS, INC. (HCE) VCS 100-2 VaporTek® THERMAL OXIDIZER WARRANTY POLICY

- This product has a 12 month warranty, which becomes effective at time of installation. This warranty applies to the initial purchaser and any subsequent purchasers, during the warranty period.
- This product is warranted to meet all the applicable performance standards and specifications, for the duration of the warranty period.
- Liability under any implied or expressed warranty is limited to replacement of the product.
- HCE is not responsible for improperly installed or misuse of the product.
- HCE cannot be held responsible for damage to the product or its equipment due to acts of nature, vandalism, or neglect.
- HCE products are warranted to be free of defects in material and workmanship.
- In the event of a warranty claim, the purchaser must obtain a Return Authorization Number prior to returning product. All shipping costs are the responsibility of the customer.
- HCE shall repair or replace, at its option, any HCE component which proves to be defective.
- The cost of labor for any field repair, removal, replacement, or diagnosis is not covered by this warranty.

- The liability of HCE is limited solely and specifically to this warranty.
- HCE shall not be liable for any special, collateral, or consequential damages arising from this warranty, the use of this equipment or from any order accepted pursuant thereto.
- The use of parts not authorized by HCE voids the warranty.
- Installation, start-up, service, or repairs of this product by personnel not certified HCE voids the above described warranty.

The following warranty card will be shipped with the Hirt VCS 100-2 VaporTek[®] Thermal Oxidizer:

PRODUCT WARRANTY CARD	
Hirt Combustion Engineers, Inc.	
Tel: (562) 692-1490	Email: HirtVCS@aol.com
IMPORTANT: INSTALLER TO COMPLETE CARD AND GIVE TO STATION OPERATOR.	
HCE warrants its California Enhanced Vapor Recovery (EVR) components for a period of one (1) year from date of installation.	
Serial Number: _____	Mfg. Date: _____
Name of Contractor: _____	
Name of Technician: _____	
Technician Signature: _____	
Technician Certification Number: _____	
Installation Date: _____	
Facility Address: _____	

The processor was factory tested to and met all applicable performance standards and specifications to which it was certified by the California Air Resources (ARB). The performance standards and specifications are listed in the applicable ARB Executive Orders and Certification Procedure 201.	

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 designate.

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 any installation of such a system.

The applicability of this test procedure for static pressure performance is for installations of 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. 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 Prior to conducting this test, the power switch to the Hirt VCS 100-2 VaporTek[®] Thermal Oxidizer shall be in the "Off" position. Not turning off the processor will indicate a system component leak. Follow instructions in the Appendix for processor configuration when conducting this test.
- 3.2 Leaks in the test equipment will bias the results toward noncompliance. 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.

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 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

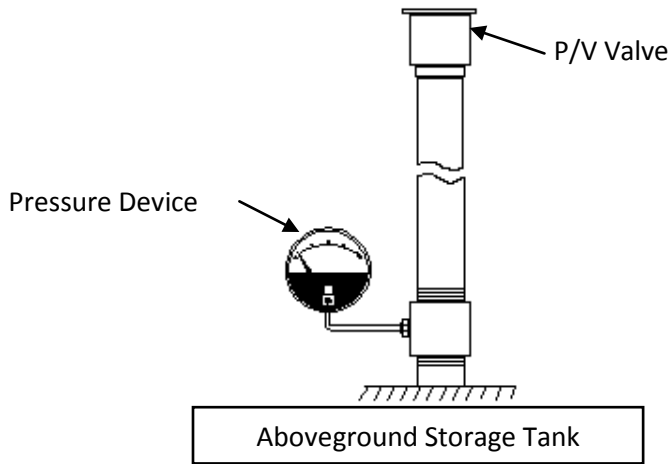
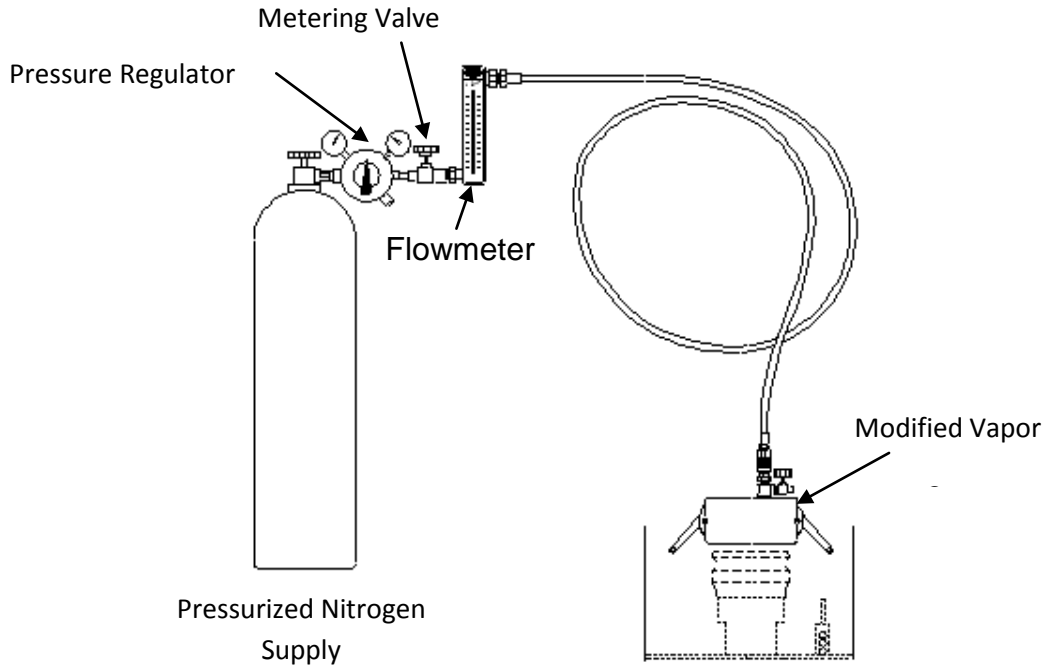
- 5.1 The electronic pressure measuring device or digital pressure indicator shall be calibrated using a National Institute of Standards and Technology (NIST) traceable standard or reference standard traceable to NIST within 180 days prior to conducting the testing and the calibration. In addition, calibration 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 date 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).

FIGURE 1
Typical System Leak Test Assembly



7. TEST PROCEDURE

- 7.1 Observe the initial storage tank pressure. If the initial pressure is greater than one-half (0.50) inch H₂O gauge, proceed to Section 7.1.1. If the initial pressure is less than zero (0.00) inch H₂O gauge, proceed to Section 7.1.2. In the case where the storage tank pressure is between 0.00 and 0.50 inches H₂O, proceed to section 7.2.
 - 7.1.1 If the initial storage tank pressure is greater than one-half (0.50) inch H₂O 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 H₂O or continues to change at a rate exceeding ± 0.02 inches H₂O 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 H₂O gauge, slowly introduce nitrogen so that the storage tank pressure is between zero (0.00) and one-half (0.50) inches H₂O 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 H₂O or continues to change at a rate exceeding ± 0.02 inches H₂O 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.

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.

Summary of Source Test Data

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

APPENDIX

Required Items in Conducting Exhibit 4

The instructions below are required when conducting Exhibit 4 with the Hirt VCS 100-2 VaporTek® Processor. The tester shall document that each step was followed as indicated below and shall include the page of this Exhibit with the submission of Exhibit 4 test results. **See footnote regarding testing of pressure/vacuum vent valve¹.** Note that districts may require use of an alternate form to meet these requirements, provided the alternate form includes the same minimum parameters.

Configuration of Hirt VCS 100-2 VaporTek® Thermal Oxidizer to Conduct Exhibit 4

Hirt VCS 100-2 VaporTek® Thermal Oxidizer Installed

1. Prior to conducting Exhibit 4, the ball valve on the inlet of the Hirt VCS 100-2 VaporTek® processor shall be Open (Open to AST Ullage), as shown in Figure 1. At the Hirt Indicator Panel, turn the Power Switch to the “Off” position.
2. After conducting Exhibit 4, turn the Power Switch to the “On” position.
3. The ball valve on the inlet of the Hirt VCS 100-2 VaporTek® processor shall remain opened and locked.

Required Steps	Verification (please circle)	
1. Inlet ball valve is open and Power Switch is in “Off” position before conducting Exhibit 4?	Yes	No
2. Power Switch is in “On” position after conducting Exhibit 4?	Yes	No
3. Inlet ball valve is in the open locked position after conducting Exhibit 4?	Yes	No

Test Company: _____ Facility Name: _____

Print Name (Technician)

Signature

Date

Technician Certification Number and Expiration Date
(ICC or District Training Certification, as applicable)

Note: The Hirt Processor Operability Test (if required by the local District), shall be performed prior to conducting Exhibit 4.

¹ **Note: If the P/V vent valve is required to be tested by the local District, then the P/V vent valve shall be tested prior to conducting Exhibit 4**

Figure 1

Configuration of Hirt VCS 100-2 VaporTek® Thermal Oxidizer to Conduct Exhibit 4

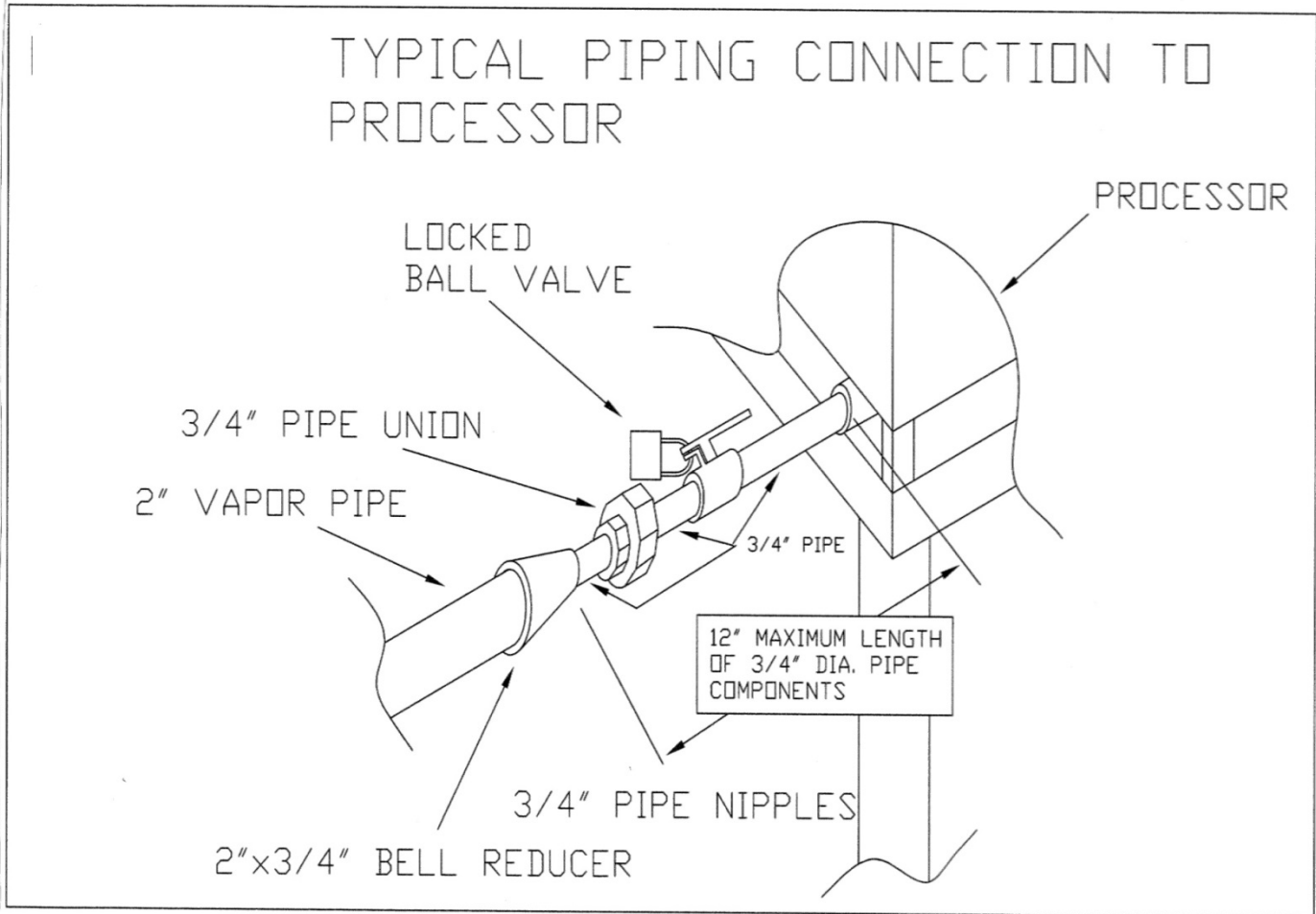


EXHIBIT 5

Liquid Removal Test Procedure

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 designate.

1. PURPOSE AND APPLICABILITY

- 1.1 This procedure is used to quantify the removal rate of liquid from the vapor passage of a Phase II balance system hose equipped with a liquid removal device. This procedure provides a method to determine compliance with the liquid removal requirements specified in ARB Executive Orders VR-501 and any subsequent amendments or revisions.

2. PRINCIPLE AND SUMMARY OF TEST PROCEDURE

- 2.1 This test procedure provides two options to determine the compliance of liquid removal devices. Under option 1 (short version), liquid in the vapor path of a coaxial hose is drained and measured. If the volume of liquid drained equals or exceeds 25 ml, a liquid removal test is conducted. For those hoses with less than 25 ml drained, no further testing is required. Under option 2 (long version), all hoses are evaluated regardless of the volume of liquid drained. Option 2 includes a prewetting and wall adhesion step. Both options test the liquid removal device by introducing gasoline into the vapor path of the coaxial hose through the nozzle bellows. After 7.5 gallons of gasoline is dispensed, the amount of gasoline remaining in the hose is measured and the liquid removal rate is determined. The district shall specify which testing option is to be used.

Caution: When draining gasoline from the vapor side of the hose, make sure the dispenser is not activated. Gasoline is drained from the vapor side of the hose by compressing the bellows and engaging the fuel lever (note the nozzle vapor valve is on the same stem as the fuel valve). If the dispenser is activated, gasoline in the fuel hose may be pressurized when engaging the fuel lever.

3. BIASES AND INTERFERENCES

- 3.1. Slits or tears in the hose or nozzle vapor path may bias the results towards compliance.

- 3.2. This test shall not be conducted on any fueling point where the hanging hardware is defective as identified in Exhibit 2.
- 3.3. Any spillage of gasoline invalidates the test for any volumes that are required to be measured or recorded.
- 3.4. A breach of the inner product hose may introduce additional gasoline into the outer vapor path resulting in a larger volume drained than introduced.
- 3.5. Not having the liquid extraction device (indicated by the mark on the outside of the hose) at the bottom of the hose loop during liquid removal testing, as shown in **Figure 1**, will bias the results towards failure.
- 3.6. When testing a fueling point with an EMCO Model A4005EVR nozzle, the test procedure requires the use of EMCO's nozzle spout plug, P/N 494635EVR as shown in **Figure 2**. If testing a fueling point with a VST Model VST-EVR-NB (G2) nozzle, the test procedure requires the use of VST's nozzle spout plug, P/N VST-STP-100 as shown in **Figure 3**. This tool is used to plug the spout when draining liquid from the vapor side of the hose. Not plugging the spout may bias the results towards failure. Nicks, cuts, or tears in the plug o-rings will bias the results towards failure.
- 3.7. Dispensing rates not between 6.0 and 10.0 gallons per minute (GPM) invalidates the test.

4. SENSITIVITY, RANGE, AND PRECISION

- 4.1 The range of measurement of the liquid removal rate is dependent upon the range of the graduated cylinder used for testing.
- 4.2 To ensure precision, graduated cylinder readings shall be measured at the liquid level meniscus.

5. EQUIPMENT

- 5.1. Nozzle Spout Plug: When testing a fueling point with a EMCO Model A4005EVR nozzle, use EMCO's nozzle spout plug, P/N 494635EVR as shown in **Figure 2**. If testing a fueling point with a VST Model VST-EVR-NB (G2) nozzle, use VST's spout plug, P/N VST-STP-100 (**Figure 3**).
- 5.2. Stopwatch. Use a stopwatch accurate to within 0.2 seconds.
- 5.3. Funnels. Large and small gasoline compatible, non-breakable, funnels with dimensions similar to those as shown in **Figure 4**, or equivalent.
- 5.4. Graduated Cylinders. Gasoline compatible, non-breakable 0-25ml, 0-100ml, 0-250 ml, and 0-500 ml graduated cylinders with stable base plates. The 25ml cylinder may be necessary to quantify volumes of liquid less than 20 ml.

- 5.5. Gasoline Test Tank. (Optional) A portable tank, meeting fire safety requirements for use with gasoline, may be used to receive the gasoline dispensed during testing. The tank shall have sufficient volume so that at least 10.0 gallons may be dispensed prior to activating the primary shutoff mechanism of the nozzle. **When using a gasoline test tank, ensure that a ground strap is used and that it is properly connected to an acceptable ground.** To minimize testing-related emissions, vehicle refueling events should be used for this procedure whenever feasible.
- 5.6. Traffic Cones. Use traffic cones to encircle the area where testing is conducted.
- 5.7. Field Data Sheet. Use the appropriate data sheet to record liquid removal test information. Forms 1 and 2 serve as examples; districts may require modified versions.
- 5.8. Gasoline Container. Use a portable fuel container equipped with a tight fitting cap, of at least 1.0 gallon capacity.

NOTE: THIS TEST PROCEDURE PROVIDES TWO OPTIONS TO DETERMINE COMPLIANCE OF LIQUID REMOVAL DEVICES. THE DISTRICT SHALL SPECIFY WHICH TESTING OPTION IS TO BE USED

6. OPTION 1 (SHORT VERSION)

PRE-TEST PROCEDURE

- 6.1 Verify that the 500 ml graduated cylinder is empty. Position the large funnel into the graduated cylinder.
- 6.2 Remove the nozzle from the dispenser. **Do not activate dispenser!** When testing a fueling point with an EMCO Model A4005EVR nozzle, install EMCO's nozzle spout plug, P/N 494635EVR in the tip of the spout (**Figure 2**). If testing a fueling point with a VST Model VST-EVR-NB (G2) nozzle, install VST's spout plug, P/N VST-STP-100 in the tip of the spout (**Figure 3**). Carefully tilt the spout into the funnel/graduated cylinder assembly.
- 6.3 Lower the nozzle and funnel/graduated cylinder assembly as close to the ground as possible. "Walk out" the hose while keeping the nozzle lowered and hose fully extended. The hose shall slope downward from the dispenser toward the nozzle.
- 6.4 **Do not activate dispenser!** Open the nozzle's vapor check valve by compressing the bellows and engaging the fuel lever. Allow 20 seconds for all liquid to drain. Use caution to avoid spillage.
- 6.5 Remove EMCO's or VST's spout plug and return the nozzle to the dispenser and measure the volume of liquid drained. If the volume drained is less than 200 ml, transfer the liquid into an appropriately sized graduated cylinder. For example, if 40 ml of liquid was drained, use the 100 ml graduated cylinder to take the measurement.

- 6.6 Record the amount of liquid drained on Form 1 (“PRE-TEST”).
- 6.7 If the volume drained is greater than or equal to 25 ml, proceed to Section 6.8 of the procedure. Hoses with greater than 25 ml drained are considered to be pre-wetted. If the amount drained is less than 25 ml, proceed to the next nozzle/hose to be evaluated and repeat Section 6.1-6.6

TEST PROCEDURE (FOR HOSES WITH GREATER THAN 25 ML DRAINED)

- 6.8 Pour 150 ml to 175 ml of gasoline into the 250 ml graduated cylinder. Measure and record this volume on Form 1 (VI).
- 6.9 Remove the nozzle from the dispenser and position the nozzle upright so that the spout is in a vertical position. **Do not activate dispenser!**
- 6.10 Open the nozzle’s vapor check valve by compressing the bellows and engaging the fuel lever. Carefully insert the stem of the small funnel between the bellows and nozzle spout.
- 6.11 Pour the measured volume into the vapor path of the hose. Use caution not to spill the gasoline. Remove the small funnel after the gasoline has been introduced.
- 6.12 Insert the nozzle into a vehicle or test tank fill pipe.
- 6.13 Find the mark on the outside of the hose which indicates the location of the liquid pick-up device. Ensure the mark is at the bottom of the hose loop when dispensing as shown in **Figure 1**. This can be accomplished by lifting up the back of the hose, adjusting nozzle position, or adjusting the test tank position.
- 6.14 Dispense 7.5 (±0.5) gallons at the highest possible flow rate by holding the nozzle lever in the maximum handheld position. Use a stopwatch to measure the time elapsed while dispensing. Record the volume of fuel dispensed (G) and the elapsed time (T) on Form 1. Return nozzle to the dispenser.
- 6.15 Calculate the dispensing rate using the equation below. If the dispensing rate is not between 6.0 and 10.0 gallons per minute (GPM), the test results are invalid.

$$\text{GPM} = 60 \times \left(\frac{\text{G}}{\text{T}} \right)$$

Where:

- GPM = dispensing rate (in gallons per minute)
- G = gallons of fuel dispensed
- T = number of seconds required to dispense

- 6.16 Using the 250 ml graduated cylinder and large funnel, carefully drain the remaining liquid from the vapor path of the hose as described in Section 6.1 through 6.5 (**make**

sure dispenser is not activated and spout plug is installed before draining liquid!. Record this quantity on Form 1 (VF).

6.17 Use Equation 9.1 to calculate the liquid removal rate for all the applicable hoses tested.

6.18 If the liquid removal rate is less than 5.0 ml/gallon, but greater than or equal to 4.5 ml/gallon, repeat the test two additional times and average the three results.

7. OPTION 2 (LONG VERSION)

PRETEST PROCEDURE

7.1 Carefully pour 150 ml of gasoline into the 250 ml graduated cylinder.

7.2 Remove the nozzle from the dispenser. **Do not activate dispenser!** When testing a fueling point with an EMCO Model A4005EVR nozzle, install EMCO's nozzle spout plug, P/N 494635EVR in the tip of the spout (**Figure 2**). If testing a fueling point with a VST Model VST-EVR-NB (G2) nozzle, Install VST's spout plug, P/N VST-STP-100 in the tip of the spout as shown in **Figure 3**. Position the nozzle upright so that the spout is in a vertical position.

7.3 Open the nozzle's vapor check valve by compressing the bellows and engaging the fuel lever. Carefully insert the stem of the small funnel between the bellows and nozzle spout.

7.4 Pour the gasoline from the 250 ml graduated cylinder into the vapor path of the hose. Use caution not to spill the gasoline. Remove the small funnel after the gasoline has been introduced.

7.5 Verify that the 500 ml graduated cylinder is empty. Position the large funnel into the graduated cylinder.

7.6 Carefully tilt the spout into the funnel/graduated cylinder assembly. **Make sure VST's or EMCO's spout plug is installed and the dispenser is deactivated.**

7.7 Lower the nozzle and funnel/graduated cylinder assembly as close to the ground as possible. "Walk out" the hose while keeping the nozzle lowered and hose fully extended. The hose shall slope downward from the dispenser toward the nozzle.

7.8 Open the nozzle's vapor check valve by compressing the bellows and engaging the fuel lever. Allow 20 seconds for all liquid to drain. Use caution to avoid spillage. If necessary, drain full graduated cylinders into a portable gas can until the hose is empty.

7.9 Remove EMCO's or VST's spout plug and return the nozzle to the dispenser.

TEST PROCEDURE

- 7.10** Pour 150 ml to 175 ml of gasoline into the 250 ml graduated cylinder. Measure and record this volume on Form 2 (VI).
- 7.11** Remove the nozzle from the dispenser. **Do not activate dispenser!** Position the nozzle upright so that the spout is in a vertical position.
- 7.12** Open the nozzle's vapor check valve by compressing the bellows and engaging the fuel lever. Carefully insert the stem of the small funnel between the bellows and nozzle spout.
- 7.13** Pour the measured volume into the vapor path of the hose. Use caution not to spill the gasoline. Remove the small funnel after the gasoline has been introduced.
- 7.14** Insert the nozzle into a vehicle or test tank fill pipe.
- 7.15** Find the mark on the outside of the hose which indicates the location of the liquid pick-up device. Ensure the mark is at the bottom of the hose loop when dispensing as shown in **Figure 1**. This can be accomplished by lifting up the back of the hose, adjusting nozzle position, or adjusting the test tank position.
- 7.16** Dispense 7.5 (± 0.5) gallons at the highest possible flow rate by holding the nozzle lever in the maximum handheld position. Use a stopwatch to measure the time elapsed while dispensing. Record the volume of fuel dispensed (G) and the elapsed time (T) on Form 2. Return nozzle to the dispenser.
- 7.17** Calculate the dispensing rate using the equation below. If the dispensing rate is not between 6.0 and 10.0 gallons per minute (GPM), the test results are invalid.

$$\text{GPM} = 60 \times \left(\frac{\text{G}}{\text{T}} \right)$$

Where:

GPM	=	dispensing rate (in gallons per minute)
G	=	gallons of fuel dispensed
T	=	number of seconds required to dispense

- 7.18** Using the 250 ml graduated cylinder and large funnel, carefully drain the remaining liquid from the vapor path of the hose as described in Section 7.5 through 7.8 (**make sure dispenser is deactivated and spout plug is installed before draining liquid!**). Record this quantity on Form 2 (VF).
- 7.19** Open the nozzle's vapor check valve by compressing the bellows and engaging the fuel lever. **Do not activate dispenser!** Carefully insert the stem of the small funnel between the bellows and nozzle spout
- 7.20** Use the 250 ml graduated cylinder and small funnel to pour 150 ml of gasoline into

the vapor passage of the hose. Dispense no gasoline.

7.21 Using the 250 ml graduated cylinder and large funnel, completely drain the gasoline from the vapor passage back into the graduated cylinder as described in Section 7.5 through 7.9 (**make sure dispenser is deactivated and spout plug is installed before draining liquid!**).

7.22 Subtract the volume drained (value from Section 7.21) from the volume added (value from Section 7.20). This value represents the volume of gasoline lost due to wall adhesion. The purpose of the wall adhesion value is to quantify the amount of gasoline lost to evaporation from transfer to and from the graduated cylinders and adhesion of liquid to vapor passage surfaces in previous measurements. Record this quantity on Form 2 (VW).

7.23 Use Equation 9.2 to calculate the liquid removal rate for all the applicable hoses tested.

7.24 If the liquid removal rate is less than 5.0 ml/gallon, but greater than or equal to 4.5 ml/gallon, repeat the test two additional times and average the three results.

8. POST TEST PROCEDURES

8.1. Ensure nozzle spout plug is removed and nozzle is hung in dispenser cradle.

8.2. Empty all containers and return any excess gasoline to the aboveground storage tank.

8.3. Remove the traffic cones from the testing area.

9. CALCULATING RESULTS

9.1 If using OPTION 1(short version), the liquid removal rate shall be calculated as follows:

$$VR = \frac{VI - VF}{G}$$

Where:

VR	=	Gasoline removed per gallon dispensed, milliliters/gallon
VI	=	Total initial volume poured into hose vapor passage, milliliters
VF	=	Volume of gasoline remaining in the hose vapor passage after dispensing, milliliters
G	=	Total dispensed, gallons

9.2 If using OPTION 2 (long version), the liquid removal rate shall be calculated as follows:

$$VR = \frac{(VI - VW) - VF}{G}$$

Where:

VR	=	Gasoline removed per gallon dispensed, milliliters/gallon
VI	=	Total initial volume poured into hose vapor passage, milliliters
VW	=	Volume of liquid lost due to wall adhesion, milliliters
VF	=	Volume of gasoline remaining in the hose vapor passage after dispensing, milliliters
G	=	Total dispensed, gallons

10. REPORTING RESULTS

- 10.1.** Record all applicable liquid removal rate information on the appropriate form as shown in Form 1 and 2. Districts may require the use of alternate forms provided that the alternate forms include the same parameters as identified in Forms 1 and 2.
- 10.2.** If the calculated liquid removal rate is greater than or equal to 5 milliliters/gallon, the liquid removal device has demonstrated compliance.
- 10.3.** If the calculated liquid removal rate is less than 5 milliliters/gallon, the liquid removal device is not in compliance.

11. 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 Executive Officer, pursuant to Section 15 of Certification Procedure CP-206.

Figure 1
Position of Liquid Removal Device
When Conducting Liquid Removal Testing

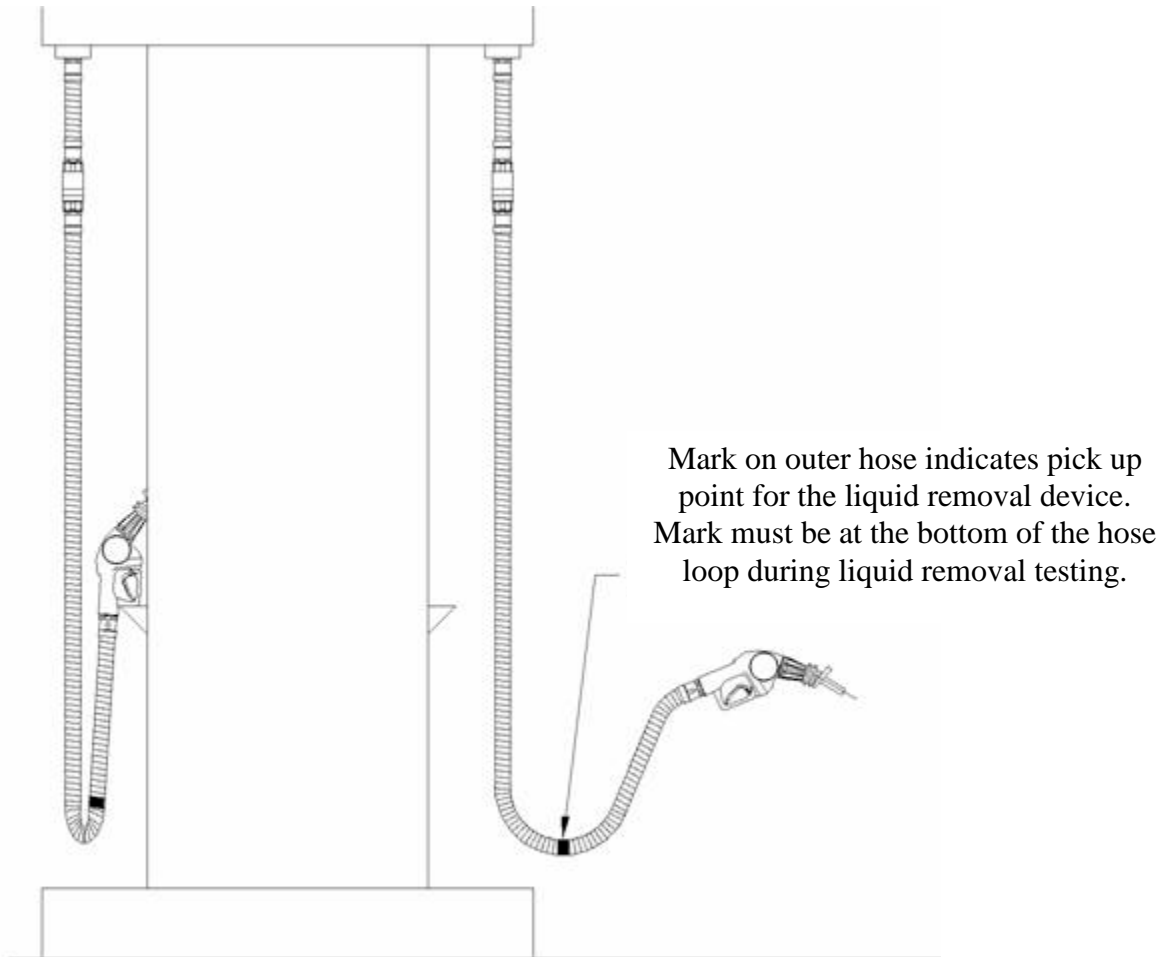


Figure 2
EMCO Nozzle Spout Plug P/N 494635EVR

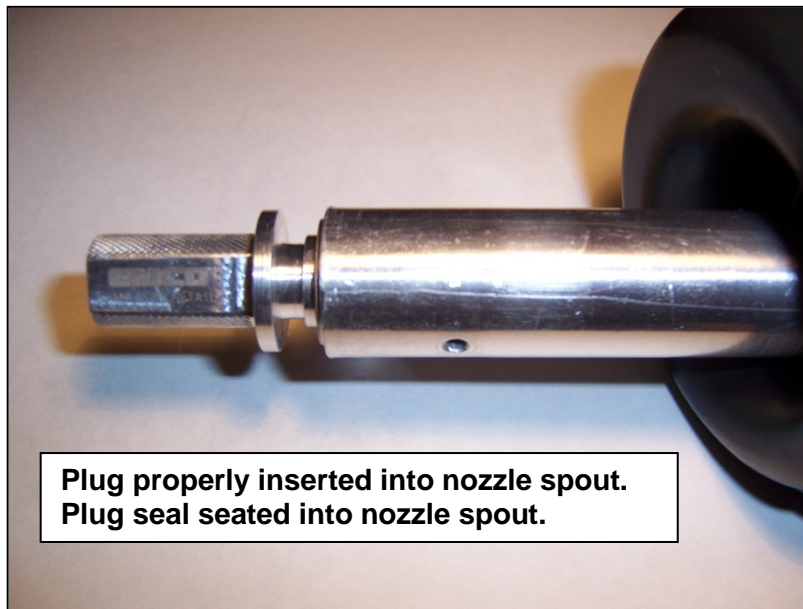
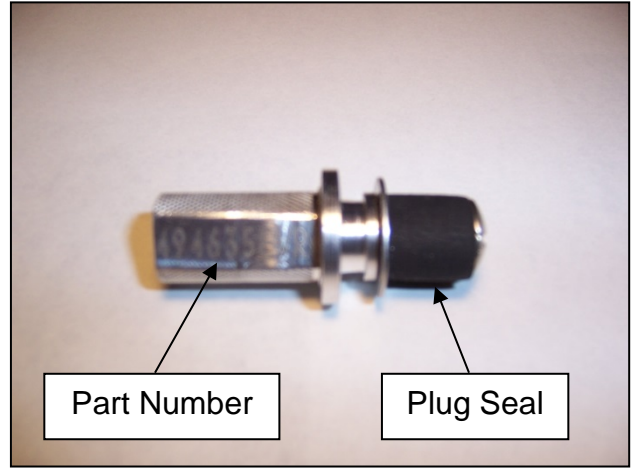
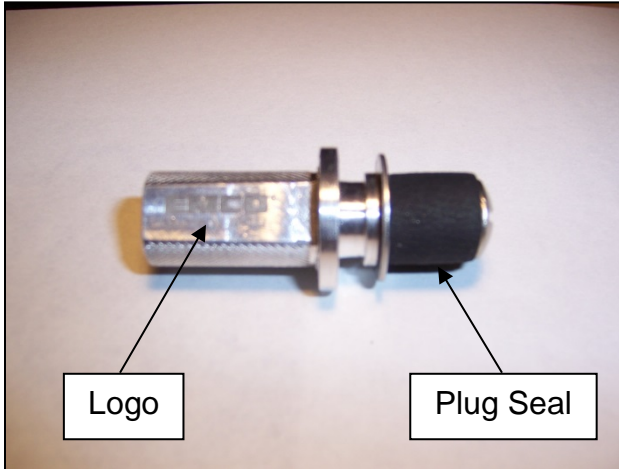
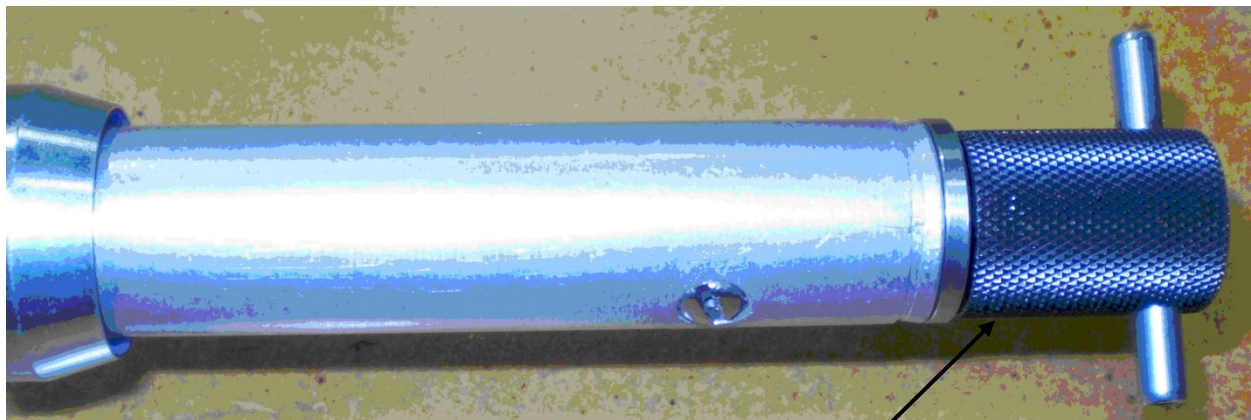
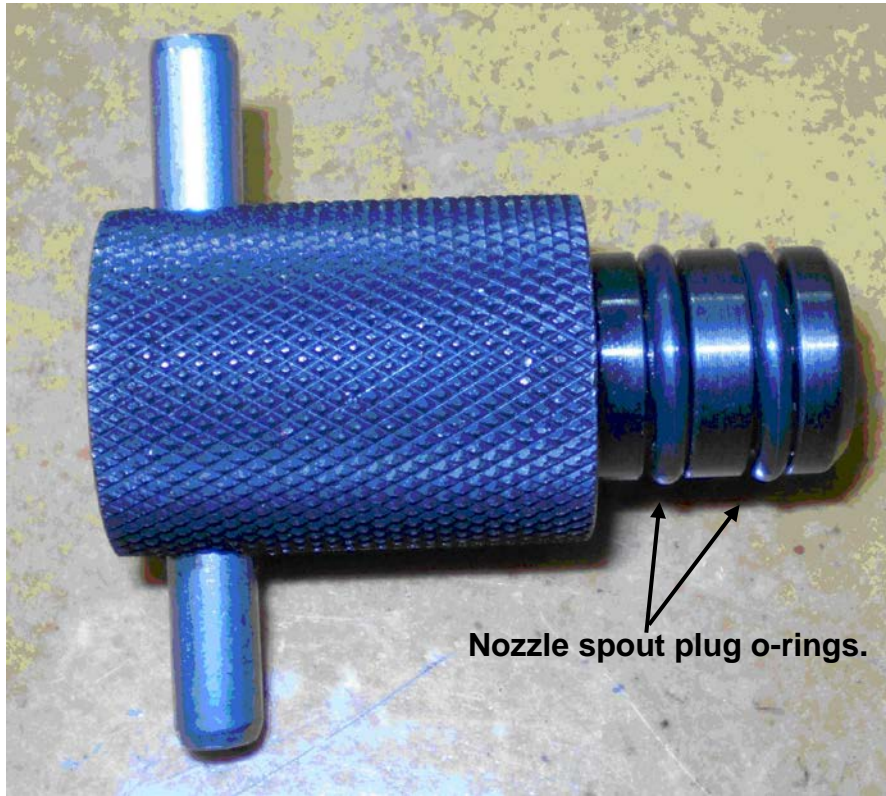
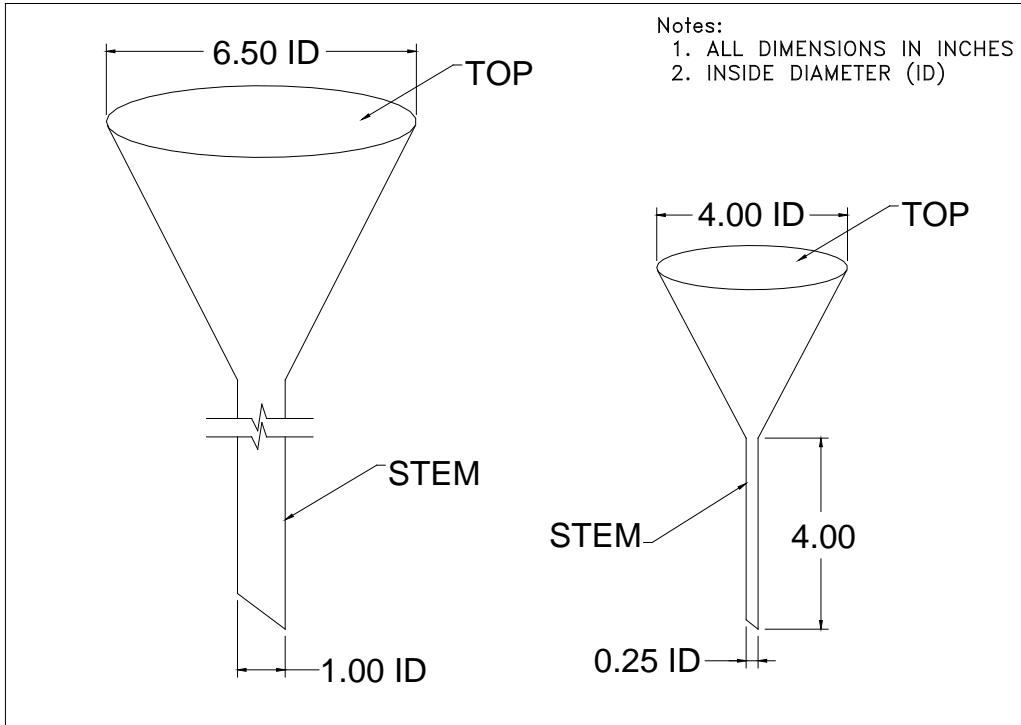


Figure 3
VST Nozzle Spout Plug P/N VST-STP-100



Plug properly inserted into nozzle spout.
Both plug o-rings seated into nozzle spout.

Figure 4
Recommended FUNNEL SPECIFICATIONS



FORM 1: LIQUID REMOVAL TEST DATA SHEET (OPTION 1)

Facility Name & Address				Facility Representative & Title				Test Date _____		
								A/C or Permit No. _____		
								Testing Company _____		
								Tester Name _____		
				Phone No. _____				EMCO Training Cert # _____		
								(if applicable) _____		
								Inspector Name _____		
GENERAL INFORMATION				PRE-TEST		TEST RUN				VR=(VI-VF)/G
Dispenser Number	Product Grade	Make & Model of Hose	Serial Number of Hose	Volume Drained From Hose in mL	Volume Poured Into Hose in mL (VI)	Gallons Dispensed (G)	Seconds to Dispense (T)	Dispensing Rate (60*(G/T))	Volume Remaining in mL (VF)	Liquid Removal Rate (mL/gal)

FORM 2: LIQUID REMOVAL TEST DATA SHEET (OPTION 2)

Facility Name & Address				Facility Representative & Title				Test Date _____ A/C or Permit No. _____ Testing Company _____ Tester Name _____ EMCO Training Cert # _____ (if applicable) Inspector Name _____		
				Phone No.						

GENERAL INFORMATION				PRE-TEST	TEST RUN					$VR = ((VI - VW) - VF) / G$
Dispenser Number	Product Grade	Make & Model of Hose	Serial Number of Hose	Volume Poured into Hose in mL (VI)	Gallons Dispensed (G)	Seconds to Dispense (T)	Dispensing Rate (60*(G/T))	Volume Remaining in mL (VF)	Volume Lost to Wall Adhesion in mL (VW)	Liquid Removal Rate (mL/gal)

EXHIBIT 7

Nozzle Bag Test Procedure

Verification of the integrity of the EMCO or VST EVR nozzle vapor valve shall be performed on installed nozzles by use of the following test.

1. If there is little or no pressure or vacuum in the headspace of the aboveground storage tank(s), a defective nozzle vapor valve may not be evident. Therefore, it is recommended that this test be conducted while the pressure in the aboveground storage tank(s) is not equal to zero, preferably greater than positive one inch of water column (+1.0"WC) or less than negative one inch of water column (-1.0"WC) vacuum.
2. Seal nozzle(s) at the gasoline dispensing facility (GDF) in a plastic bag, using tape or other means to secure the bag around the base of the nozzle (see Figure 1). Any plastic bag large enough to enclose the nozzle and having a thickness of no greater than 2 mils can be used.
2. Observe the bagged nozzle(s) for 30 seconds.
3. Any nozzle where the bag can be seen visually expanding or collapsing has a defective vapor valve and is not in compliance with Exhibit 2.
4. Record the test results on the "Nozzle Bag Test Results" form provided in this Exhibit. Districts may require use of an alternate form, provided that the alternate form includes the same minimum parameters.
5. Remove the bags from all the nozzles and return the nozzles to the dispenser holsters.

Figure 1: Example of Bagged Nozzle



EXHIBIT 8

Hirt VCS 100-2 VaporTek[®] Processor with Indicator Panel Operability Test Procedure

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 “ARB Executive Officer” refers to the Executive Officer of the ARB or his or her authorized representative or designate.

1. PURPOSE AND APPLICABILITY

This test procedure verifies the operational status of the Hirt VCS 100-2 VaporTek[®] Processor and Indicator Panel.

The station may remain open (normal fuel dispensing) while conducting this procedure.

2. PRINCIPLE AND SUMMARY OF TEST PROCEDURE

The Hirt VCS 100-2 VaporTek[®] Processor is designed to activate (e.g. thermally oxidize vapors) when the aboveground storage tank (AST) ullage pressure exceeds a nominal -0.40 inches water column (“w.c.”). Processor activation will be verified by exposing the processor’s internal vacuum sensor/switch to an atmospheric pressure input. The processor should activate and the Indicator Panel Processing lamp should light.

3. BIASES AND INTERFERENCES

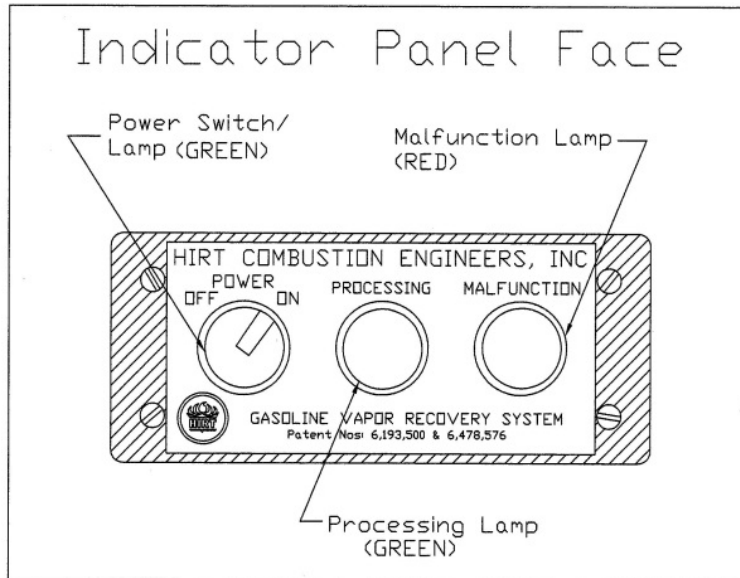
- 3.1 This test is only valid when total ullage is 70% or less than capacity of GDF storage tanks.
- 3.2 At least 24 hours must have elapsed after any tests that introduce air and/or nitrogen into the vapor spaces, such as, but not limited to TP-206.3 (including Exhibit 4), TP-201.4 (including Exhibit 6) and Exhibit 5.
- 3.3 There shall be no Phase I bulk product deliveries into or out of the storage tank(s) within the three (3) hours prior to the test or during performance of this test procedure.
- 3.4 Processor should be inactive (i.e. powered but not processing gasoline vapor).

4. EQUIPMENT

- 4.1 Hand tools: 5/16” nut driver or equivalent, 3/8” open end wrench.
- 4.2 Stopwatch: Use a stopwatch with an accuracy of ± 0.2 seconds.
- 4.3 Teflon pipe tape.

5. TEST PROCEDURE

- 5.1 System Status Check: Locate Hirt Indicator Panel and verify that the green lamp on the POWER switch is lit, to be sure power is ON. Record on Form 1. If the Power switch is not lit, the processor does not meet the Exhibit 2 Hirt VCS 100-2 VaporTek® Thermal Oxidizer specifications and no testing shall be conducted.

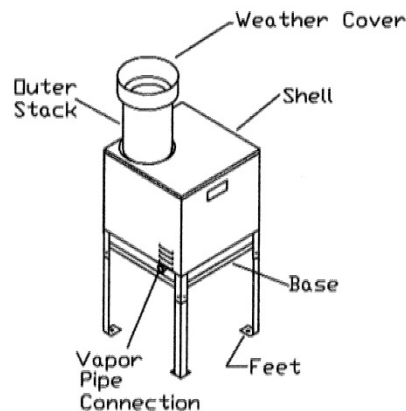


- 5.2 Check green PROCESSING lamp on Indicator Panel. Is the green PROCESSING lamp on? Record on Form 1. If so, then wait until PROCESSING lamp is extinguished before proceeding to step 5.3, to meet BIAS condition 3.4.

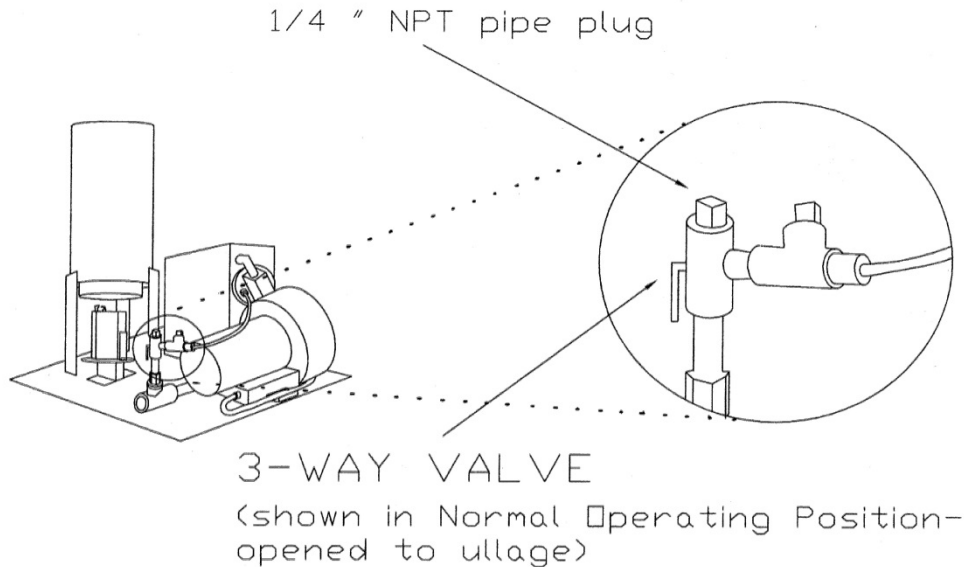
- 5.3 Forced Processor Operation: Turn POWER to processor OFF at Indicator Panel.

CAUTION: Processor components, such as Shell, Stack, Burner, and Weather Cover can be Hot! Use care when handling processor or removing its parts.

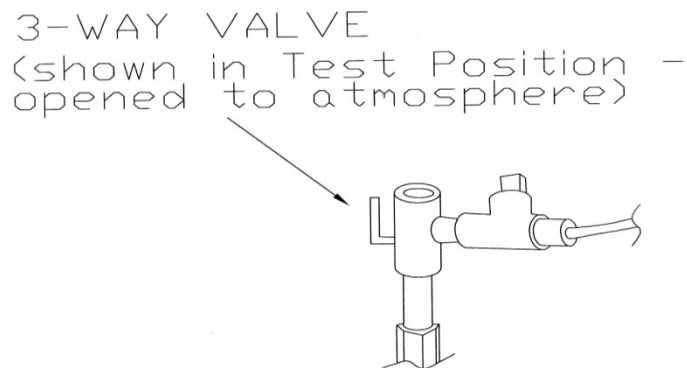
- 5.4. Remove screw from Weather Cover with 5/16" nut driver and remove Weather Cover from Outer Stack.



- 5.5 Remove (4) screws holding Shell to Base with 5/16" nut driver and then remove Shell.
- 5.6 Locate 3-Way Valve on tubing leading to Vacuum Sensor/Switch. The 3-Way Valve handle should be pointing down, in the Normal Operating Position – Opened to AST Ullage. Remove the 1/4" NPT pipe plug from 3-Way Valve with 3/8" wrench.



- 5.7 Turn 3-Way Valve handle to the up position.



- 5.8 Turn POWER to processor ON at Indicator Panel, and verify that green lamp on POWER switch is lit. Start the stopwatch.
- 5.9 Verify green PROCESSING lamp on the Indicator Panel lights within 3 minutes. Record on Form 1. If the Processing lamp is on, processor meets the Exhibit 2 Processor specifications. If the Processing lamp is not on within 3 minutes, the processor does not meet the Exhibit 2 Processor specifications and needs technical service.
- 5.10 Verify the MALFUNCTION lamp on the Indicator Panel lights within sixty two (62) minutes. Record on Form 1. If the MALFUNCTION lamp is on, processor meets the Exhibit 2 Processor specifications. If the MALFUNCTION lamp is not on within sixty

two (62) minutes, the processor does not meet the Exhibit 2 Processor specifications and needs technical service.

5.11 Turn POWER to processor OFF at Indicator Panel.

5.12 Turn 3-Way Valve handle back down to Normal Operating Position. Reinstall 1/4" NPT plug (with Teflon pipe tape) and tighten ¼ turn past snug. Reinstall Shell and Weather Cover.

5.13 Turn POWER to processor ON at Indicator Panel. Testing is completed.

6. REPORTING

Record all results on Form 1. Districts may require the use of an alternate Form, provided it includes the same minimum parameters as identified in Form 1.

**FORM 1:
HIRT VCS 100-2 VAPORTEK[®] PROCESSOR OPERABILITY TEST**

DATE OF TEST:

SERVICE COMPANY NAME		SERVICE COMPANY'S TELEPHONE	
SERVICE TECHNICIAN		HIRT TECHNICIAN CERTIFICATION #(as applicable) CC or DISTRICT TRAINING CERTIFICATION (as applicable)	
STATION NAME		DISTRICT PERMIT #	
STATION ADDRESS		CITY	STATE ZIP
Was TP-206.3 (Including Exhibit 4) conducted in the last 24 hours?		Yes ____	No ____
Was TP-201.4 (Including Exhibit 6) conducted in the last 24 hours?		Yes ____	No ____
Was Exhibit 5 conducted in the last 24 hours?		Yes ____	No ____
Was there a fuel delivery within the last 3 hours?		Yes ____	No ____
The % ullage of GDF storage tank(s) is _____ gallons.			
STEP 5.1	Is POWER switch lit?	YES	<input type="checkbox"/>
		NO	<input type="checkbox"/>
STEP 5.2	Is PROCESSING lamp ON?	YES	<input type="checkbox"/>
	If "YES", test cannot be performed until lamp goes off.	NO	<input type="checkbox"/>
STEP 5.9	Time for PROCESSING Lamp to Light? _____ minutes	YES	<input type="checkbox"/>
	Did PROCESSING Lamp light within three (3) minutes?	NO	<input type="checkbox"/>
STEP 5.10	Time for OVERPRESSURE Lamp to Light? _____ minutes	YES	<input type="checkbox"/>
	Did OVERPRESSURE Lamp light within sixty two (62) minutes?	NO	<input type="checkbox"/>

EXHIBIT 9

Liquid Condensate Trap Compliance Test Procedure

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 designate.

1. PURPOSE AND APPLICABILITY

This procedure is used to verify the automatic evacuation of the Liquid Condensate Trap (LCT), the Liquid Sensor Alarm, as well as Visual and Audible Alarm. This procedure provides a method to determine compliance with the LCT requirements specified in ARB Executive Order VR-501 and any subsequent amendments or revisions.

2. PRINCIPLE AND SUMMARY OF TEST PROCEDURE

This test procedure provides a method to determine the compliance of LCTs. Gasoline is added to the LCT until the Liquid Sensor activates an alarm. The gasoline in the LCT is then allowed to be evacuated until the Liquid Sensor Alarm has cleared.

3. BIASES AND INTERFERENCES

- 3.1. There can be no Phase I deliveries to the gasoline aboveground storage tank (AST) while performing this test.
- 3.2. To ensure that the gasoline level is below the vapor tube on the side of the Turbine Pump the gasoline level in the AST (connected to the LCT) must be below its 90 percent capacity level.

4. EQUIPMENT

- 4.1. Five (5) gallon gasoline container and funnel or other method of pouring gasoline into the LCT.

5. PRETEST PROCEDURE

- 5.1. Notify the Certified Unified Program Agency (CUPA) prior to conducting this test procedure. A list of CUPAs can be found at www.calepa.ca.gov/CUPA/Directory/default.aspx.
- 5.2. No dispensing is allowed to any vehicle for the duration of the test.
- 5.3. Prior to testing, turn off the 87 grade turbine pump that is connected to the LCT suction line. (This is to keep from evacuating the LCT when adding gasoline for testing.)
- 5.4. Record LCT capacity in Form 1. A metal tag specifying LCT capacity is installed above the Fuel Entry Point (See Figures 1 and 2). If LCT capacity tag is not installed, the LCT is not in compliance with Exhibit 2 specifications.

6. TEST PROCEDURE:

- 6.1. Remove plug or cap on Fuel Entry Point installed at the suction riser of the LCT. Add gasoline through the open Fuel Entry Point (see Figures 1, 2 and 3). Note: Gasoline may be added at one of the dispenser risers in lieu of the LCT Fuel Entry Port.

For a typically sized LCT (9.9 gallons) this will be approximately 2 to 3 gallons of gasoline because the Liquid Sensor is installed at 2 inches from the bottom of the LCT (See Figure 4). For larger LCTs do not introduce more gasoline than 10 percent capacity of the LCT.

- 6.2. Verify the Liquid Sensor activates an Audible and Visual Alarm at the tank monitoring system control panel (control panel) and obtain a printout of the alarm/sensor status (see attached Appendix A for instructions on printing out the sensor alarm report for the Veeder-Root and INCON tank monitoring systems). Record results on Form 1 and attach printout of sensor status. After verification you may silence the Alarm.

If there is **No** Audible and Visual Alarm at the control panel within five (5) minutes, the LCT is not in compliance with Exhibit 2 specifications.

- 6.3. Verify Liquid Evacuation: Turn on the turbine pump that is connected to the LCT. Maintain this turbine pump operation (running) until the Liquid Sensor Alarm has cleared (*i.e.* turned off). Record results on Form 1 and attach printout of sensor status (see attached Appendix A for instructions on printing out the sensor alarm report for the Veeder-Root and INCON tank monitoring systems).

Note: To keep this turbine pump running you may need to authorize more than one fueling point during the testing period. For a typical LCT capacity of 10 gallons, it will take approximately 10 to 15 minutes to evacuate 3 gallons of gasoline.

If the Liquid Sensor Alarm **does not clear**, (gasoline is not being evacuated), the LCT is not in compliance with Exhibit 2 specifications.

7. POST TEST PROCEDURE:

If plug or cap on the LCT Fuel Entry Point was removed, reinstall using pipe thread sealant (*e.g.* pipe dope) **and** gasoline compatible PTFE tape (*e.g.* Teflon® tape, plumber's tape, or tape dope). If gasoline was introduced at one of the dispenser risers, reconnect the dispenser vapor piping to the riser.

8. REPORTING RESULTS

Record all alarms and evacuation test results, as well as any failures on Form 1. Ensure all printouts from control panel are attached to Form 1. Districts may require the use of alternate forms provided that the alternate forms include the same parameters as identified in Form 1.

Figure 1
Example Configuration

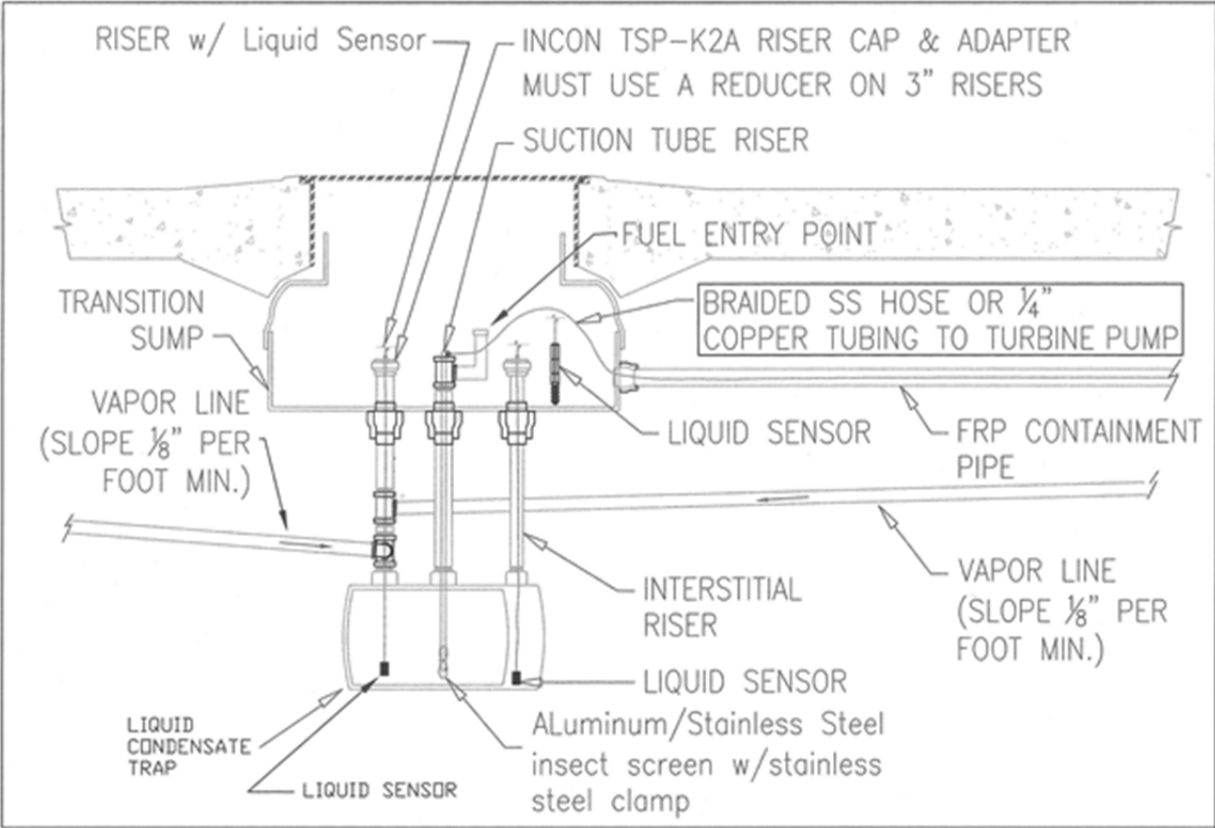


Figure 2
Open Fuel Entry Point

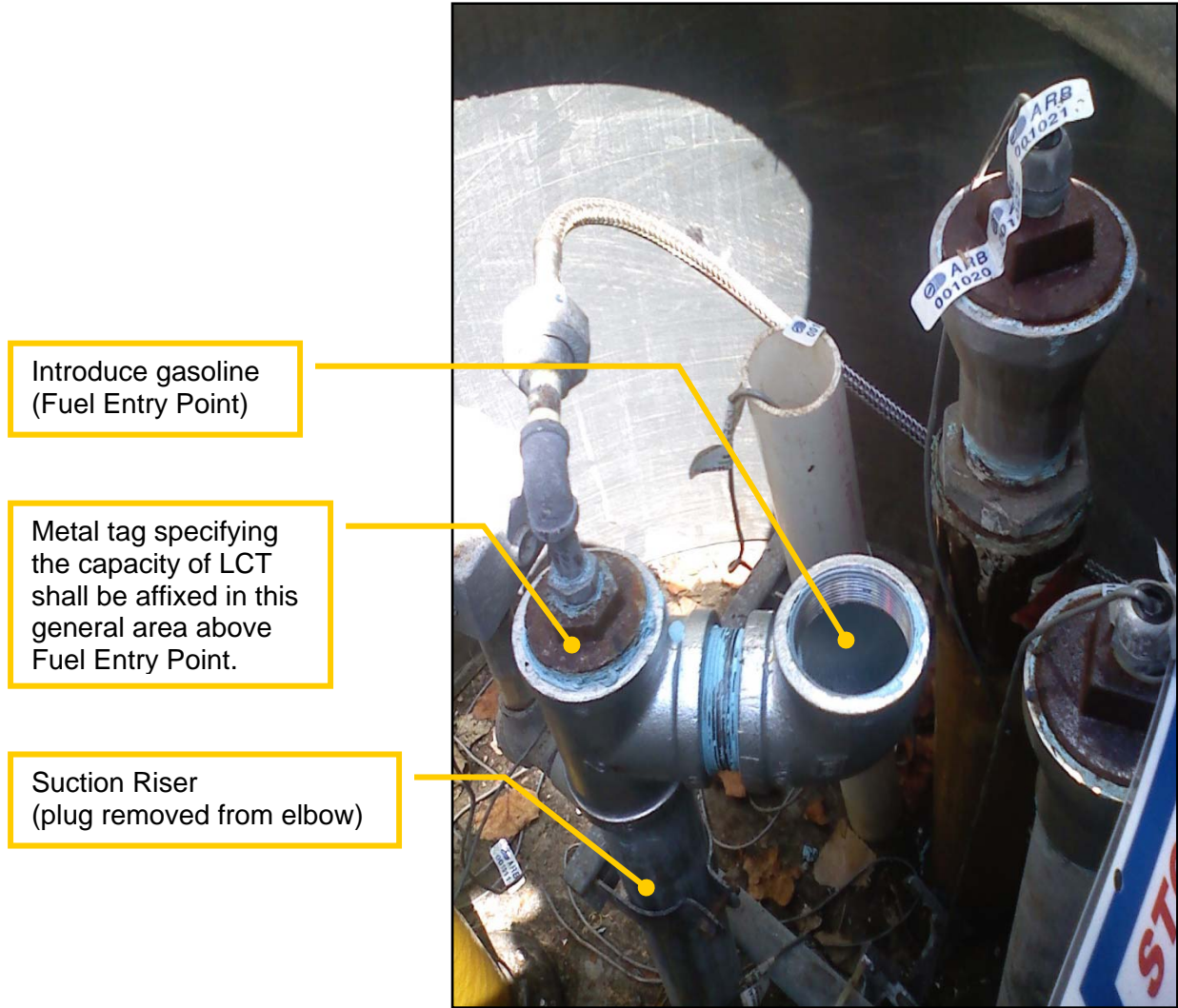
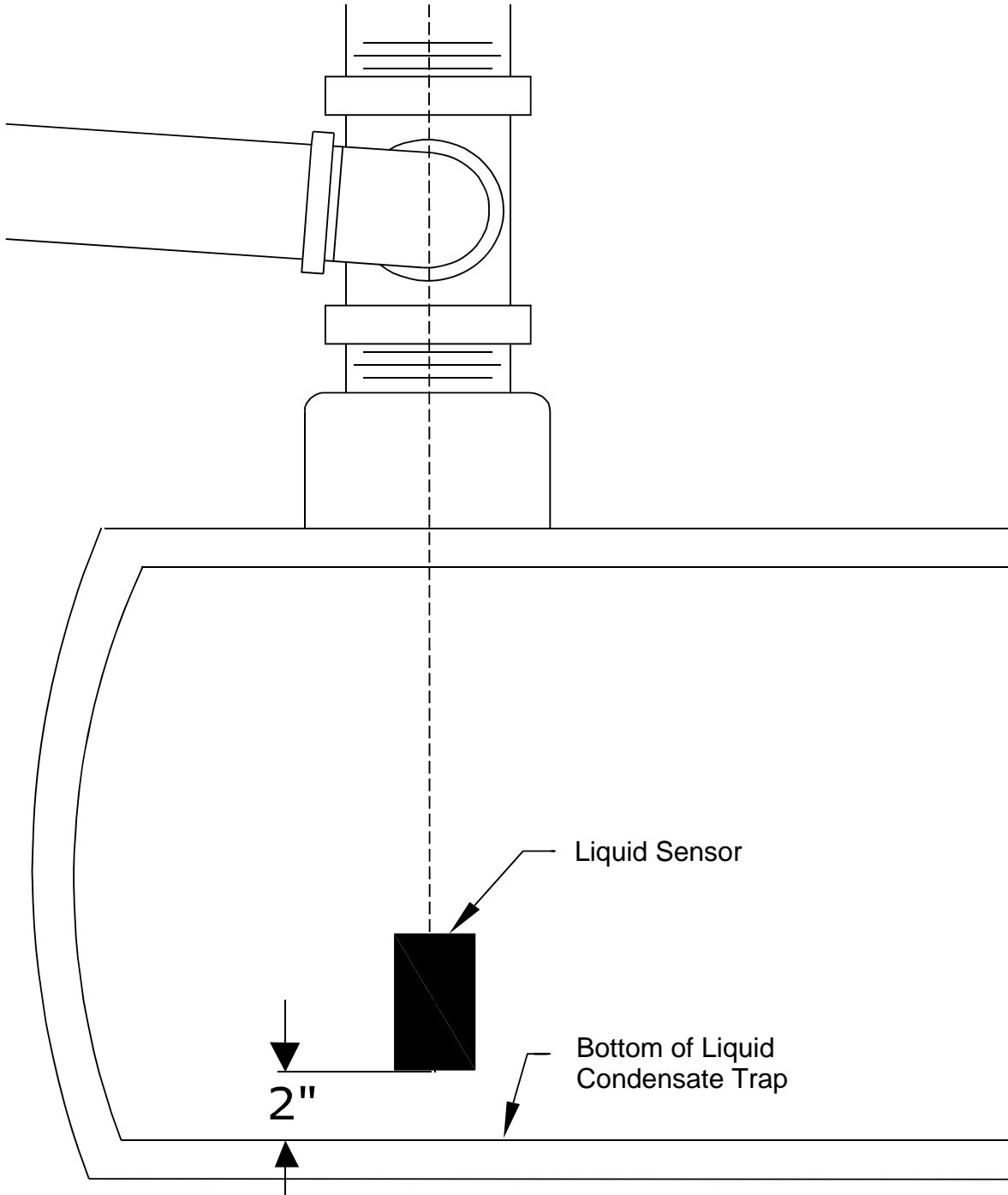


Figure 3
Adding Gasoline through Open Fuel Point



Figure 4
Liquid Sensor Height Setting



**Form 1
Required Data When Conducting the
Liquid Condensate Trap Compliance Test Procedure**

Liquid Condensate Trap Compliance Test Form	
Service Company Name	Service Company's Telephone
Date of Test	Certification #'s (as applicable) <u>Healy Tech. Cert. #</u>
Station Name and Address	<u>District Training Cert. #</u> <u>ICC Cert. #</u>
Service Technician (print name and sign)	District Permit #
	Capacity of LCT in gallons

Applicable Step Number	Requirement	Verification (please circle)	
Step 3.2	Gasoline below 90 percent capacity level of AST?	Yes	No
Step 5.3	Was tag with LCT capacity present above Fuel Entry Point?	Yes	No
Step 6.2	Did Liquid Sensor activate an Audible Alarm as well as a Visual Alarm at control panel within five minutes after adding gasoline? (Attach alarm/sensor status printout to this Form.)	Yes	No
Step 6.3	Did LCT evacuate and Sensor Alarms clear? (Attach alarm/sensor status printout to this Form.)	Yes	No

APPENDIX A

Veeder Root LCT Liquid Sensor Alarm Report

There are many manufacturers of AST tank monitoring systems. The following are steps to print the Liquid Sensor Alarm History Report from the AST tank monitoring console for the Veeder-Root TLS-350 Tank Monitoring System.

Note: When the LCT liquid sensors were originally programmed into the Tank Monitoring System the title given to those sensors included “LCT” in the name (*for example* if Liquid Sensor 10 is the High Level Liquid Sensor for the LCT it could have been named “L10 LCT High Liquid”.)

Veeder-Root TLS Console

Liquid Sensor Alarm History Reports are a record of the last three alarms for the liquid sensor selected. To print a liquid Sensor Alarm History Report **and** if Maintenance Tracker is enabled go to Exhibit 18 for instructions (to temporarily disable Maintenance Tracker) and then return to instructions below.

How to Obtain Liquid Condensate Trap (LCT) Alarm Print-outs

Step	Button Pushed	Number of Times Pushed	Readout
1	MODE	Multiple, Push until readout on right is shown	SETUP MODE
2	FUNCTION	Multiple, Push until readout on right is shown	LIQUID SENSOR SETUP
3	PRINT *	Once	LIQUID SENSOR SETUP
4	MODE	Multiple, Push until readout on right is shown	DIAG MODE
5	FUNCTION	Multiple, Push until readout on right is shown	ALARM HISTORY REPORT
6	STEP	Multiple, Push until readout on right is shown	L#: ALARM HISTORY
7	TANK/SENSOR	Multiple, until you reach the liquid sensor number assigned to the High Liquid Level in the LCT.	EXAMPLE: L10:LCT HIGH LIQUID
8	PRINT**	Once	EXAMPLE: L10:LCT HIGH LIQUID
9	MODE	Multiple, Push until readout on right is shown	MM DD, YYYY HH:MM:SS: XM ALL FUNCTIONS NORMAL

*A printout will be generated displaying a read-out of all liquid sensors. Find the liquid sensor number assigned to the LCT.

**A printout will be generated displaying the last three alarms for the Liquid sensor assigned to the LCT.

APPENDIX A CONTINUED INCON LCT LIQUID SENSOR ALARM REPORT

Follow the figures below to print a Sensor Report for LCT Alarm (Do not select Alarm History):

