

**State of California
AIR RESOURCES BOARD**

Executive Order G-70-183

**Certification of the
Healy/Franklin Vacuum Assist Phase II Vapor Recovery System**

WHEREAS, the California Air Resources Board ("the Board" or "CARB") 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 vapor recovery systems) in its "CP-201 Certification Procedure for Vapor Recovery Systems of Dispensing Facilities" (the "Certification Procedures") as last amended April 12, 1996, incorporated by reference into Title 17, California Code of Regulations, Section 94011;

WHEREAS, the Board has established, pursuant to California Health and Safety Code sections 39600, 39601 and 41954, test procedures for determining the compliance of Phase II vapor recovery systems with emission standards in its "Certification and Test Procedures for Vapor Recovery Systems," CP-201.1 through CP-201.6 ("the Test Procedures") as adopted April 12, 1996, incorporated by reference into Title 17, California Code of Regulations, Section 94011;

WHEREAS, James W. Healy of Healy Systems, Incorporated ("Healy") has requested certification of the Franklin Electric VP-1000 Vapor Pump with the Healy Model 600 Vapor Recovery Nozzle (Healy/Franklin System) pursuant to the Certification Procedures and Test Procedures;

WHEREAS, the Healy/Franklin System has been evaluated pursuant to the Board's Certification Procedures;

WHEREAS, Section 7 of the Certification Procedures provides that the Executive Officer shall issue an order of certification if he or she determines that the vapor recovery system conforms to all of the requirements set forth in Section 1 through 7 of the Certification Procedures;

WHEREAS, Section 3.5 of the Certification Procedures provides that Phase II systems must be capable of fueling any motor vehicle that may be fueled at service stations not equipped with vapor recovery systems;

WHEREAS, the Executive Officer acknowledges the need for the introduction of vapor recovery systems that are compatible with, and efficient when refueling, vehicles having an onboard refueling vapor recovery system (ORVR vehicles); and

WHEREAS, Sections 3.4.1, 5.4 and 7 of the Certification Procedures provide that the Executive Officer may condition the certification of any system;

WHEREAS, I, Michael P. Kenny, Air Resources Board Executive Officer, find that the Healy/Franklin System, conforms with all the requirements set forth in the Certification Procedures, and results in a vapor recovery system which is at least 95 percent effective for attendant and/or self-serve use at gasoline service stations when used in compliance with this Order and when used in conjunction with a Phase I vapor recovery system which has been certified by the Board and meets the requirements contained in Exhibit 2 of this Order.

NOW, THEREFORE, IT IS HEREBY ORDERED that the Healy/Franklin System, when used with a CARB-certified Phase I system and as specified in this Order, is certified to be at least 95 percent effective in attended or self-serve mode. **Compatibility of this system with onboard vapor refueling vapor recovery (ORVR) systems, and fugitive emissions which may occur when the underground storage tanks are under positive pressure, have not yet been quantified and were not included in the calculation of system effectiveness. This system shall be subjected to testing and evaluation of effectiveness fueling ORVR-equipped vehicles six months after the Board adopts applicable test procedures.** Exhibit 1 contains a list of the equipment certified for use with the Healy/Franklin System. Exhibit 2 contains installation and performance specifications for the system. Exhibit 3 contains a procedure for testing the static pressure integrity of the underground storage tank. Exhibit 4 contains a procedure for verifying the dispensing rate. Exhibit 5 contains a description of the ORVR-compatible nozzle factory rebuild program.

IT IS FURTHER ORDERED that the dispensing rate for installations of the Healy/Franklin System shall not exceed ten (10.0) gallons per minute when only one nozzle associated with the product supply pump is operating. This is consistent with the flow-rate limitation imposed by United States Environmental Protection Agency as specified in the Federal Register, Volume 58, Number 55, page 16019. The dispensing rate shall be verified as specified in Exhibit 4.

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

IT IS FURTHER ORDERED that the following requirements are made a condition of certification. The Healy/Franklin System shall be installed only in facilities which are capable of demonstrating ongoing compliance with the vapor integrity requirements contained in Exhibit 3 of this Order. The owner or operator of the installation shall conduct, and pass, a Static Pressure Decay test as specified in Exhibit 3, no later than 60 days after startup and at least once in each twelve month period. The owner or operator of the installation shall conduct, and pass, an Air-to-Liquid Ratio test as

specified in TP-201.5 no later than 60 days after startup and at least once in each twelve month period thereafter. The test results shall be made available to the local air pollution control or air quality management district upon request within fifteen days after the tests are conducted, or within fifteen days of the request. Alternative test procedures may be used if determined by the Executive Officer, in writing, to yield comparable results.

IT IS FURTHER ORDERED that the following requirement is made a condition of certification. Within 180 days of the effective date of the Board's adopted test procedure for determining whether a vapor recovery system is efficient when fueling ORVR vehicles (ORVR Efficiency Test Procedure), this Order shall expire as provided in CP-201 section 1.

IT IS FURTHER ORDERED that the Healy/Franklin System, as installed, shall comply with the procedures and performance standards the test installation was required to meet during certification testing. If, in the judgment of the Executive Officer, a significant fraction of installations fails to meet the specifications of this certification, or if a significant portion of the vehicle population is found to have configurations which significantly impair the system's collection efficiency, the certification itself may be subject to modification, suspension or revocation.

IT IS FURTHER ORDERED that the Healy/Franklin System shall, at a minimum, be operated in accordance with the manufacturer's recommended maintenance intervals and shall use the manufacturer's recommended operation, installation, and maintenance procedures.

IT IS FURTHER ORDERED that Healy Model 600 nozzles shall be 100 percent performance checked at the factory, including checks of the integrity of the vapor and liquid path, as specified in Exhibit 2 of this Order, and of the proper functioning of all automatic shut-off mechanisms.

IT IS FURTHER ORDERED that each vapor pump shall be adjusted and 100-percent performance checked at the factory, including verification that the pump performance is within the range specified in Exhibit 2 of this Order.

IT IS FURTHER ORDERED that the Healy/Franklin System shall be performance tested during installation for ability to dispense gasoline and collect vapors without difficulty, in the presence of the station manager or other responsible individual. Healy Systems shall provide, to the station owner, operator or designee, CARB-approved copies of the installation and maintenance manuals along with instructions in the proper use of the Healy/Franklin System, its repair and maintenance schedule, and where system and/or component replacements can be readily obtained, which are to be stored at the facility, and a copy of this Order. Revisions to the manual are subject to approval by CARB.

IT IS FURTHER ORDERED that the Healy/Franklin System, shall be warranted by Healy Systems, in writing, for at least one year, to the ultimate purchaser and each subsequent purchaser, that the vapor recovery system is designed, built and equipped so as to conform at the time of original installation or sale with the applicable regulations and is free from defects in materials and workmanship which would cause the vapor recovery system to fail to conform with applicable regulations. Healy Systems shall provide copies of the manufacturer's warranty for the Healy/Franklin System, to the station manager, owner or operator. Hoses, nozzles and breakaway couplings shall be warranted to the ultimate purchaser as specified above for at least one year, or for the expected useful life, whichever is longer.

IT IS FURTHER ORDERED that for a period of four years after CARB has certified ORVR-compatible Healy nozzles, Healy shall extend a continuous offer, either directly or indirectly (through Healy's dealer network) to any owner of a nozzle which is part of a Healy Model 600 system, to replace the Healy nozzle (replaced Healy nozzle) with a CARB-certified, ORVR-compatible Healy nozzle. The modifications which are necessary to achieve compatibility with ORVR systems under the Board's adopted ORVR Efficiency Test Procedure (Healy ORVR-compatible nozzle) shall be included in the replacement nozzle, with no additional costs for the modification. The replacement nozzle shall be made available on such terms as Healy customarily imposes, at no additional cost as a factory rebuilt nozzle of the same model as the replaced Healy nozzle, subject to normal price increases over time.

IT IS FURTHER ORDERED that any alteration of the equipment, parts, design, or operation of the systems certified hereby is prohibited, and deemed inconsistent with this certification, unless such alteration has been approved by the Executive Officer or his or her designee.

Executed at Sacramento, California, this _____ day of _____, 1998.

signed March 4, 1998
Michael P. Kenny

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EXHIBIT 1

EQUIPMENT LIST

<u>Component</u>	<u>Manufacturer/Model Number</u>	<u>State Fire Marshal Identification</u>
Nozzles	Model 600 (Exhibit 2 Fig. 2B-1) (with vapor valve)	005:027:018
Vapor Pumps (Collection Unit)	Franklin Electric Model VP-1000 Vapor Pump.(Exhibit 2 Fig. 2B-2)	005:027:014
Inverted Coaxial Hoses	Healy Model 75B (3/4" I. D.) Healy Model 88B (7/8" I. D.) OR Any inverted coaxial hose CARB-certified for use with the Healy Model 600 system.	005:027:003 005:027:004 005:027:005
Hose Adapters	Healy Model series CX6- followed by suffix letter(s) "G", "D", "U", "VV1", "VV2", "VV3", "TCSVV", "DWVV" "VV1A", "VV2A", "VV3A", "TCSVVA", "DWVVA" Note: The "A" indicates that no valve is provided in the fitting because the vapor valve is integrated into the nozzle. "G" Gilbarco Dispensers "D" Dresser/Wayne Dispensers "U" Universal Dispensers "VV1" Dispensers-Lowboy (with vapor valve) "VV2" Vapor Ready Balance Type "VV3" Universal Dispensers "TCSVV" Tokheim Dispensers "DWVV" Dresser/Wayne Dispensers	005:027:019

<u>Component</u>	<u>Manufacturer/Model Number</u>	<u>State Fire Marshal Identification</u>
Breakaway Couplings	Healy Model 8701VV	005:027:016
	OR Any breakaway coupling with a vapor valve which is CARB-certified for use with the Healy Model 600 system	
Flow Control Units	Healy Model 1301 or 1302	005:027:020
	OR Any inverted coaxial flow control unit which is CARB-certified for use with the Healy Model 600 Vapor Recovery System.	
Pressure/Vacuum Valves	OPW 523LP, 523LPS (settings as specified below)	005:008:051
	Hazlett H-PVB-1 Gold label (settings as specified below)	005:017:004
	Morrison Brothers 749CRB0600 AV (settings as specified below)	005:041:001
	OR Any CARB-certified valve with the following pressure and vacuum settings, in inches water column (wc): <u>Pressure</u> : three plus or minus one-half inches (3.0 ± 0.5") water column. <u>Vacuum</u> : eight plus or minus two inches (8 ± 2") water column.	
Phase I Adaptors	Any CARB-certified device which prevents loosening or overtightening of the Phase I product and vapor adaptors. <u>Note</u> : For systems installed before two CARB-certified devices which prevent loosening or overtightening of the Phase I product and vapor adaptors are available, or within sixty days after that date, any CARB-certified Phase I product adaptor may be used for a period not to exceed four years from the date the second device was certified.	

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EXHIBIT 2

SPECIFICATIONS FOR THE HEALY/FRANKLIN SYSTEM

Typical installations of the Healy system are shown in Figures 2A-1 through 2A-6.

Nozzle

1. A vapor guard shall be installed on the nozzle at the base of the spout, as shown in Exhibit 2, Figure 2B-1. Any nozzle with a vapor guard which is missing, or which is damaged such that a slit from the outer edge of the open end flange to the spout anchor clamp, or which has an equivalent cumulative damage, is defective and shall be immediately removed from service.
2. Failure mode testing demonstrated that blockage of vapor collection holes in the spout has negligible effect on the operation of the system until 4 or more of the 8 holes are blocked. Any nozzle which has fewer than four unblocked holes is defective, and shall be immediately tagged or locked out of service until repaired or replaced.
3. The Healy Model 600 nozzle has 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. Any nozzle with a defective vapor valve shall be immediately removed from service. The integrity of the system shall be restored by replacing the nozzle or otherwise closing the vapor path as soon as practicable.
4. Nozzles shall be 100 percent performance checked at the factory, including checks of all shutoff mechanisms and of the integrity of the vapor path. The maximum allowable leak rate for the nozzle vapor path shall not exceed the following:
 - 0.038 CFH at a pressure of two inches water column (2" wc), and
 - 0.005 CFH at a vacuum of eighty three inches water column (approx. 3 psi).

Dispensing Rate

1. The dispensing rate for installations of the Healy Model 600 System with the Franklin Electric VP-1000 Vapor pump system shall not exceed 10.0 gallons per minute when only one nozzle associated with the product supply pump is operating. This shall be determined as specified in Exhibit 4.
2. The dispensing rate shall be not less than 6.0 gallons per minute when measured at the highest possible flowrate and when only one nozzle associated with the

product supply pump is operating. Failure to demonstrate at least 6.00 gpm shall be cause for issuing a notice to comply.

Inverted Coaxial Hoses

1. The maximum length of the hose shall be 13 feet.
2. The length of hose which may be in contact with the island and/or ground when the nozzle is properly mounted on the dispenser is limited to six inches (6") per loop.

Breakaway Couplings

1. Breakaway couplings are optional but, if installed, only CARB-certified breakaways with a valve which closes the vapor path when separated may be used.

Healy 600 System with Franklin Electric VP 1000 Vapor Pump

1. The Healy 600 System with Franklin Electric VP 1000 Vapor Pump shall consist of an integrated vapor recovery unit made up of an electronic (computerized) control unit and a one-eighth (1/8) hp alternating current electric motor that drives a variable speed rotary vane pump. The VP-1000 Vapor Recovery Vane Pump has been sized to satisfy the recovery needs of one dispenser, with two hoses, pumping either individually or simultaneously. Healy Systems supplies a unique regulation valve, built into the face plate of the pump assembly, to assure that proper levels of vacuum are maintained. The actual vapor recovery rate is determined by a valve in the nozzle which senses product flow. As the flow of fuel changes, the Healy 600 System with Franklin Electric VP 1000 Vapor Pump responds with a change in pump speed to produce adequate vacuum to maintain a vapor to liquid ratio of approximately 1.1.

The A/L ratio of the system measured at a flowrate between six and ten gallons per minute (6 - 10 gpm), shall be 1.10 plus or minus 0.10 (1.00 to 1.20). Any fueling point not capable of demonstrating compliance with this performance standard shall be deemed defective and removed from service. The A/L ratio shall be determined by using the CARB-approved procedure TP-201.5. Alternative test procedures may be used if they are determined by the Executive Officer, in writing, to yield comparable results.

NOTE: Test Procedure TP-201.5 returns air rather than vapor to the storage tank, and normally causes an increase in storage tank pressure which may result in vent emissions. This is a temporary condition due to the test and should not be considered an indication of malfunction or noncompliance.

2. The Healy 600 System with Franklin Electric VP 1000 Vapor Pump shall have the following electronic protective features:
 - Over-Temperature Protection. The system shall shut down if the pump exceeds 90 degrees Celsius. Once shut down, the system shall reset automatically when the pump cools down below 80 degrees Celsius.

- Voltage Protection. For systems designed to operate with 115 volts, the system electronic controls shall automatically regulate voltages of 90 to 135 volts to provide the proper operating voltage for the motor. Voltages outside of this range shall cause the system to shut down (i.e., high voltage may result in over heating and/or power levels being exceeded). For systems designed to operate with 230 volts, the operating voltage range is specified at 180 to 270 volts.
 - Power Level Control. The system shall automatically sense conditions that cause high power levels and shall shut down. Conditions causing high power levels include the following: blocked pump inlets, locked rotor condition of the motor, shorted motor windings and pump overload conditions. An error signal shall be sent to the master control inside the service station. The system shall then restart automatically. This "shut down send signal wait-restart" cycle will occur three times. On the third cycle it shall not restart automatically. Instead it must be manually reset by a "restart signal" from the service station.
3. The system shall generate an error signal if a liquid blockage in the vapor path is sustained for more than 15 seconds.

Dispenser Specifications

1. If the Healy 600 System with Franklin Electric VP 1000 Vapor Pump is installed in dispensers other than those specified in Exhibit 1 of this Order, then each dispenser shall be:
 - a) CARB-certified in the applicable revision of Executive Order G-70-52, or exempt under the provisions of Exhibit 2, Footnote 4, of that Order.
 - b) Electronically compatible with the Healy 600 System with Franklin Electric VP 1000 Vapor Pump, which must be capable of displaying the electronic protective features as specified in this Exhibit.
 - c) Tested for compliance with air to liquid ratio limits contained in this Exhibit. The test shall be conducted in accordance with TP 201.5, or an alternative test method approved in writing by the Executive Officer.

Pressure/Vacuum Valves for Storage Tank Vents

1. At least one pressure/vacuum (P/V) valve shall be installed on tank vents. Manifolding of vent lines to minimize the number of P/V valves and potential leak sources is recommended, provided the manifold is installed at a height not less than 12 feet above the driveway surface used for Phase I tank truck filling operations. At least one P/V valve shall be installed on manifolded vents. If two P/V valves are desired, they shall be installed in parallel, so that each can serve as a backup for the other if one should fail to open properly. The P/V valve shall be a CARB-certified valve as specified in Exhibit 1. The outlets shall vent upward and be located to eliminate the possibility of vapor accumulating or traveling to a source of ignition or entering adjacent buildings.

2. The P/V valve is designed to open at a pressure of approximately three inches water column (3" wc). Storage tank pressure which exceeds 3" wc for more than a short time may indicate a malfunctioning pressure/vacuum vent valve.

Vapor Recovery Piping Configurations

1. The recommended maximum pressure drop through the system, measured at a flow rate of 60 SCFH with dry Nitrogen gas, is 0.05 inches water column. The maximum allowable pressure drop through the system shall never exceed one-half inch (0.5") water column at 60 SCFH. The pressure drop shall be measured from the dispenser riser to the UST with pressure/vacuum valves installed and with the popped Phase I vapor connection open.
2. The recommended slope for all vapor lines shall be 1/4" per linear foot. Under no circumstances shall the slope be less than 1/8" per linear foot.
3. The dispenser shall be connected to the riser with either flexible or rigid material which 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 UST. The vapor plumbing within the dispenser shall be 1/2" OD copper tubing minimum.
4. All vapor return and vent piping shall be installed in accordance with the manufacturer's instructions and all applicable regulations.
5. No product shall be dispensed from any fueling point associated with a vapor line which is disconnected and open to the atmosphere. If vapor lines are manifolded, this includes all fueling points in the facility.
6. The recommended nominal inside diameter of the underground Phase II plumbing is as indicated in Figures 2A-1 through 2A-5. Smaller vapor lines are not recommended but may be used provided the pressure drop criteria specified above are met. The vapor return lines shall be manifolded below grade at the tanks as indicated in the figures.
7. The dispenser shall be connected to the vent riser with either flexible or rigid material which 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 storage tank. The internal diameter of the connector, including all fittings, shall not be less than five-eighths inch (5/8") for factory equipped dispensers. Exception: Healy Model series Z0XXX vapor recovery retrofit kits. The Z0XXX series retrofit kits consist of two 0.5" OD copper tube and flare fittings connecting all hose outlet fittings on one side of the dispenser to a 1/2" pipe running vertically from the canopy to the base of the dispenser where 0.5" OD copper tubing and flare fittings continue to make

connection to the underground vapor return riser. This piping configuration is required on each side of the dispenser.

8. All vapor return and vent piping shall be installed, at a minimum, in accordance with the manufacturer's instructions and all applicable regulations.

Inverted Coaxial Hose Adapters

1. Inverted coaxial hose adapters shall be 100 percent performance checked at the factory to verify the integrity of the vapor path. The adapters shall be tested to the same criteria specified for nozzles in the section above.

Underground Storage Tank (UST) Pressure

WARNING: Phase I fill caps should be opened with caution because the storage tank may be under pressure.

Phase I System

1. The Phase I system shall be a CARB-certified system which is in good working order and which demonstrates compliance with the static pressure decay test criteria contained in Exhibit 3 of this Order. Coaxial Phase I systems shall not be used with new installations of the Healy 600 System with Franklin Electric VP 1000 Vapor Pump. Replacement of storage tanks at existing facilities, or modifications which cause the installation of new or replacement Phase I vapor recovery equipment, are considered new installations with regard to this prohibition. An exception to this prohibition may be made for coaxial Phase I systems CARB-certified after January 1, 1994, as compatible for use with Phase II systems which require pressure/vacuum vent valves.

Where installation of the Healy Model 600 system is made by retrofitting previously installed equipment, local districts may elect to allow existing coaxial Phase I systems to remain in use for a specifically identified period of time provided the following conditions are met:

- the existing coaxial Phase I system is a poppeted, CARB-certified system capable of demonstrating compliance with the static pressure decay test as specified above; and
 - installation of the Phase II system requires no modification of the UST(s) and/or connections.
2. Spill containment manholes which have drain valves shall demonstrate compliance with the static pressure decay criteria with the drain valves installed as in normal operation. Manholes with cover-actuated drain valves shall not be used in new installations (as defined above) after May 1, 1995. Manholes with cover-actuated drain valves may remain in use in facilities where installation of the Healy Model 600 system does not require modification of the tank fittings provided the facility

demonstrates compliance with static pressure decay test criteria both with the cover open and with the cover closed. The local district may require the removal of drain valves provided an alternate method of draining the spill container is specified (i.e., a hand pump maintained at the facility and/or on the product delivery trucks).

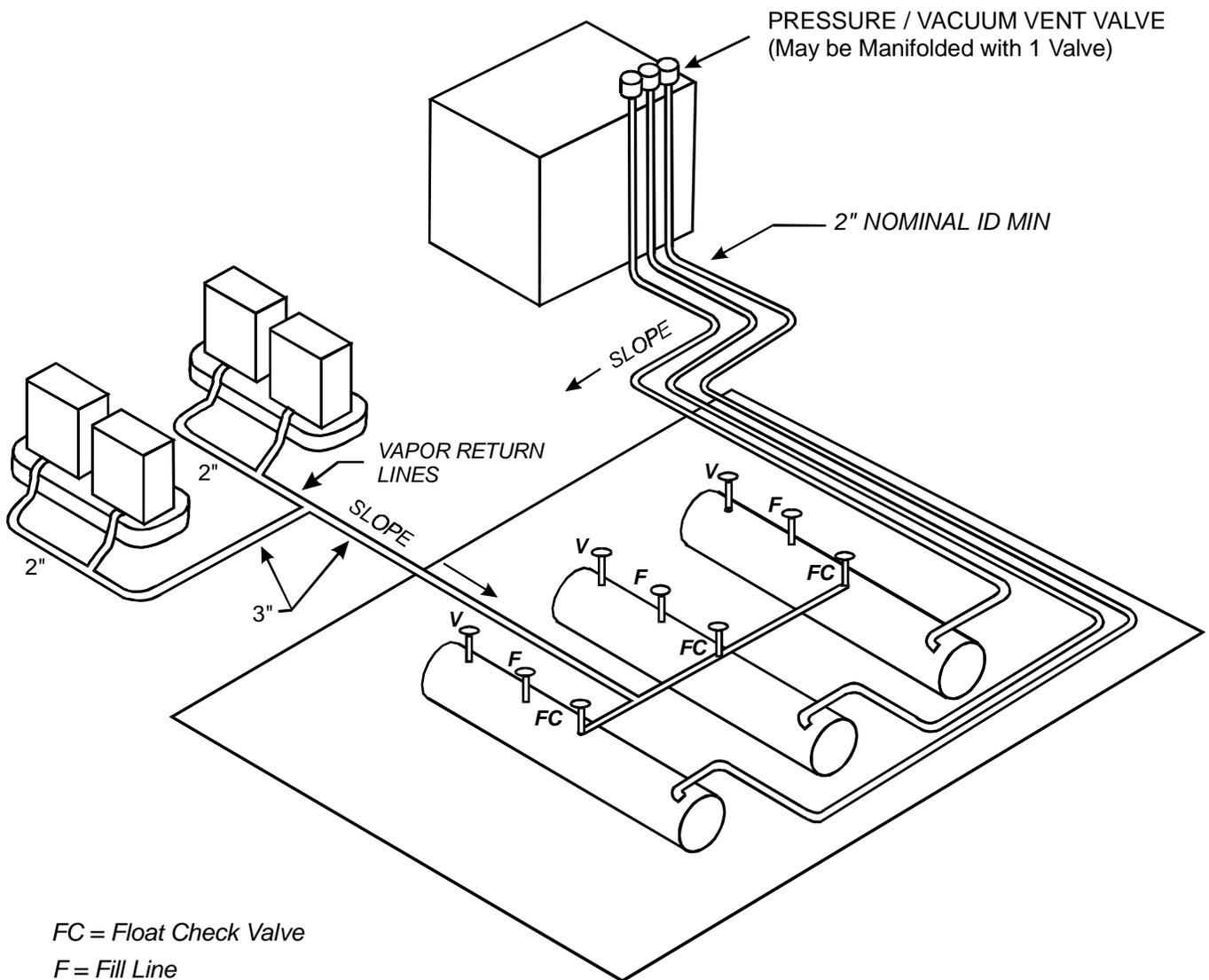
3. The Phase I vapor recovery system shall be operated during product deliveries so as to minimize the loss of vapors from the facility storage tank which may be under pressure. There shall be no less than one vapor return hose connected for each product being delivered. Provided it is not in conflict with established safety procedures, this may be accomplished in the following manner:
 - the Phase I vapor return hose is connected to the delivery tank and to the delivery elbow before the elbow is connected to the facility storage tank;
 - the delivery tank is opened only after all vapor connections have been made, and is closed before connection of any vapor return hoses;
 - the existing coaxial Phase I equipment is in good working order and has demonstrated compliance with static pressure decay test criteria when tested with all fill caps removed; and
 - the vapor return hose is disconnected from the facility storage tank before it is disconnected from the delivery tank.
4. Storage tank vent piping shall be maintained white, silver or beige. Colors which will similarly prevent heating of the system due to solar gain may also be used, provided they are listed in the EPA AP-42 as having a factor the same as or better than that of the colors listed above.
5. Manholes shall be maintained a color which minimizes solar gain, as specified above. Manhole covers which are color coded for product identification are exempted from this requirement.

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Exhibit 2

Figure 2A-1

Typical Installation of the Healy Model 600 Phase I Vapor Recovery System with Franklin Electric VP-1000 Vapor Pump



FC = Float Check Valve

F = Fill Line

V = Phase I Vapor Recovery

Note: 1. All Vapor/Vent Lines are 3" Nominal ID Minimum Except as Noted

2. Slope: 1/8" per foot Min.

1/4" per Foot Preferred

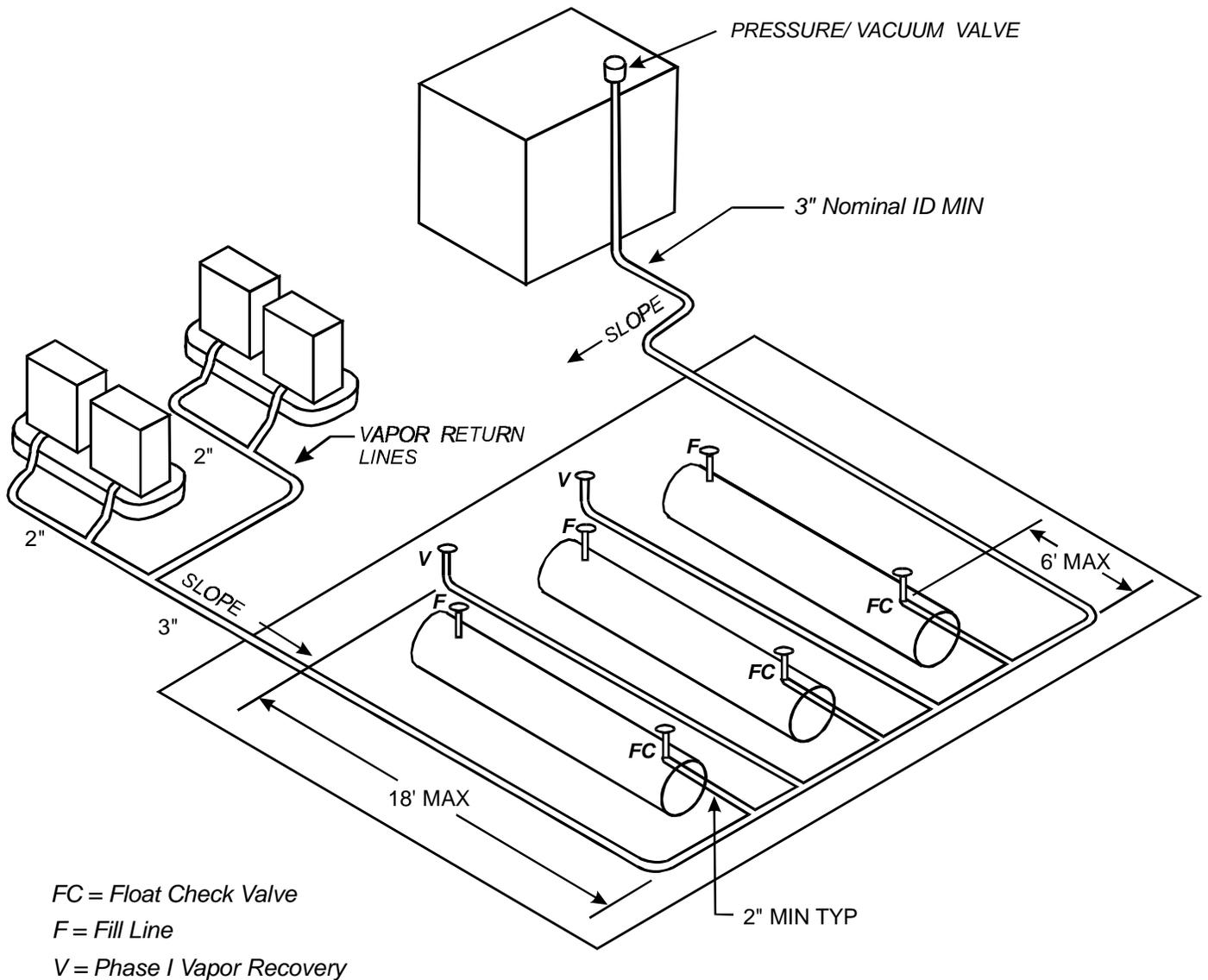
3. Maintain 2'0" Clearance Between Fill Line and
Phase I Vapor Return Line to Delivery Truck

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Exhibit 2

Figure 2A-2

Typical Installation of the Healy Model 600 Phase I Vapor Recovery System with Franklin Electric VP-1000 Vapor Pump



Note: 1. All Vapor/Vent Lines are 3" Nominal ID Minimum Except as Noted

2. Slope: 1/8" per foot Min.

1/4" per Foot Preferred

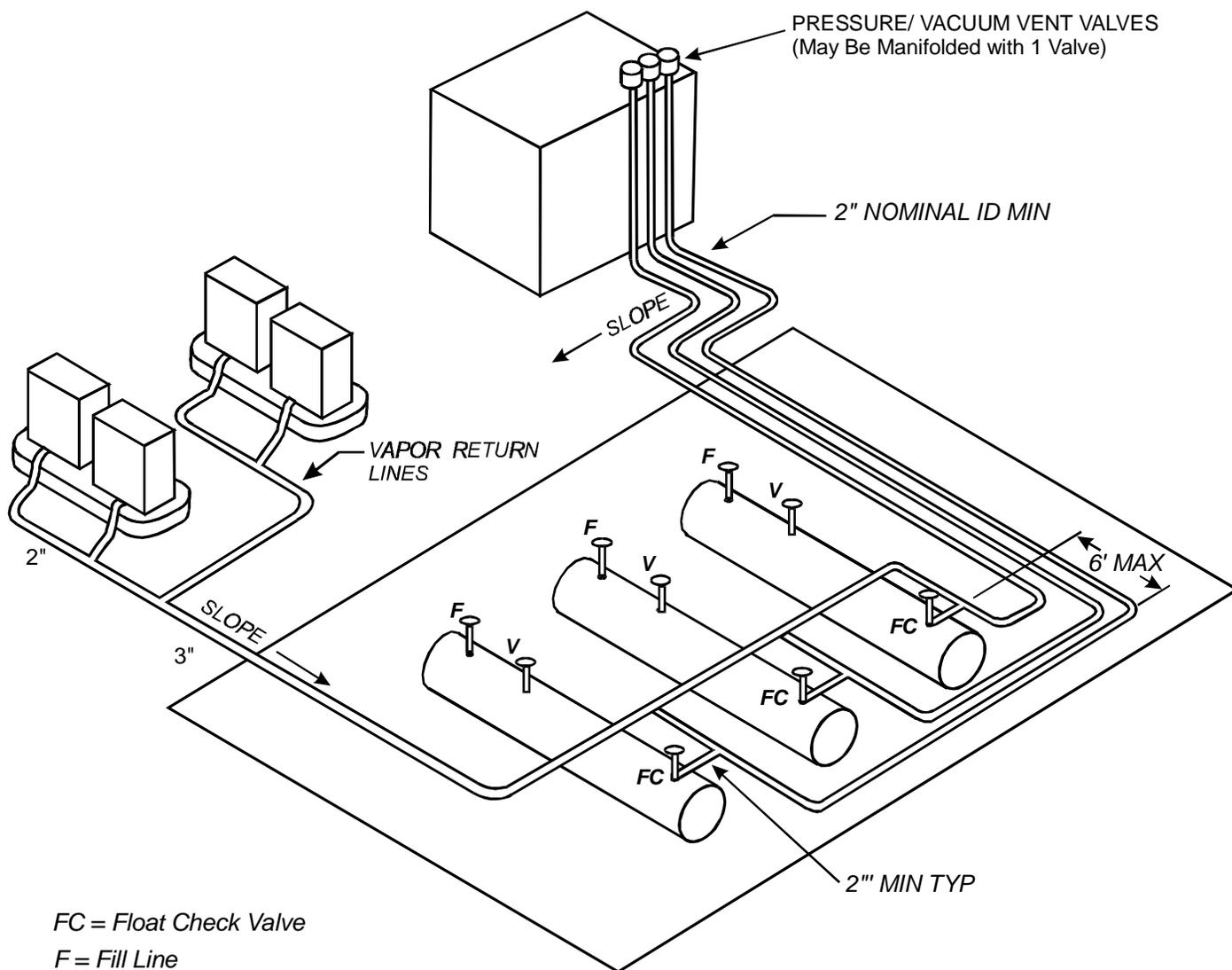
3. Maintain 2'0" Clearance Between Fill Line and
Phase I Vapor Return Line to Delivery Truck

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Exhibit 2

Figure 2A-3

Typical Installation of the
Healy Model 600 Phase I Vapor Recovery System
with Franklin Electric VP-1000 Vapor Pump



FC = Float Check Valve

F = Fill Line

V = Phase I Vapor Recovery

Note: 1. All Vapor/Vent Lines are 3" Nominal ID Minimum Except as Noted

2. Slope: 1/8" per foot Min.

1/4" per Foot Preferred

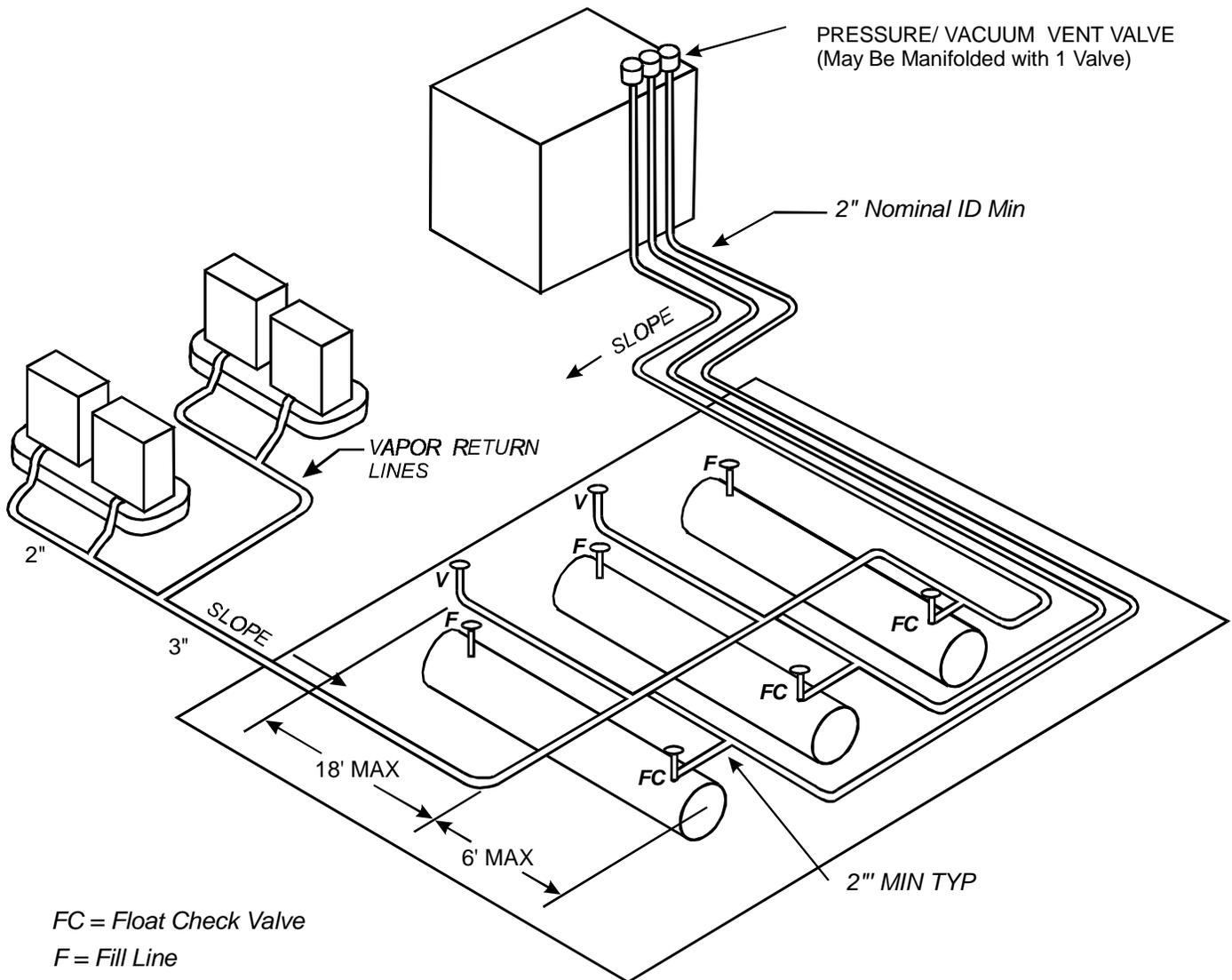
3. Maintain 2'0" Clearance Between Fill Line and
Phase I Vapor Return Line to Delivery Truck

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Exhibit 2

Figure 2A-4

Typical Installation of the Healy Model 600 Phase I Vapor Recovery System with Franklin Electric VP-1000 Vapor Pump



FC = Float Check Valve

F = Fill Line

V = Phase I Vapor Recovery

Note: 1. All Vapor/Vent Lines are 3" Nominal ID Minimum Except as Noted

2. Slope: 1/8" per foot Min.

1/4" per Foot Preferred

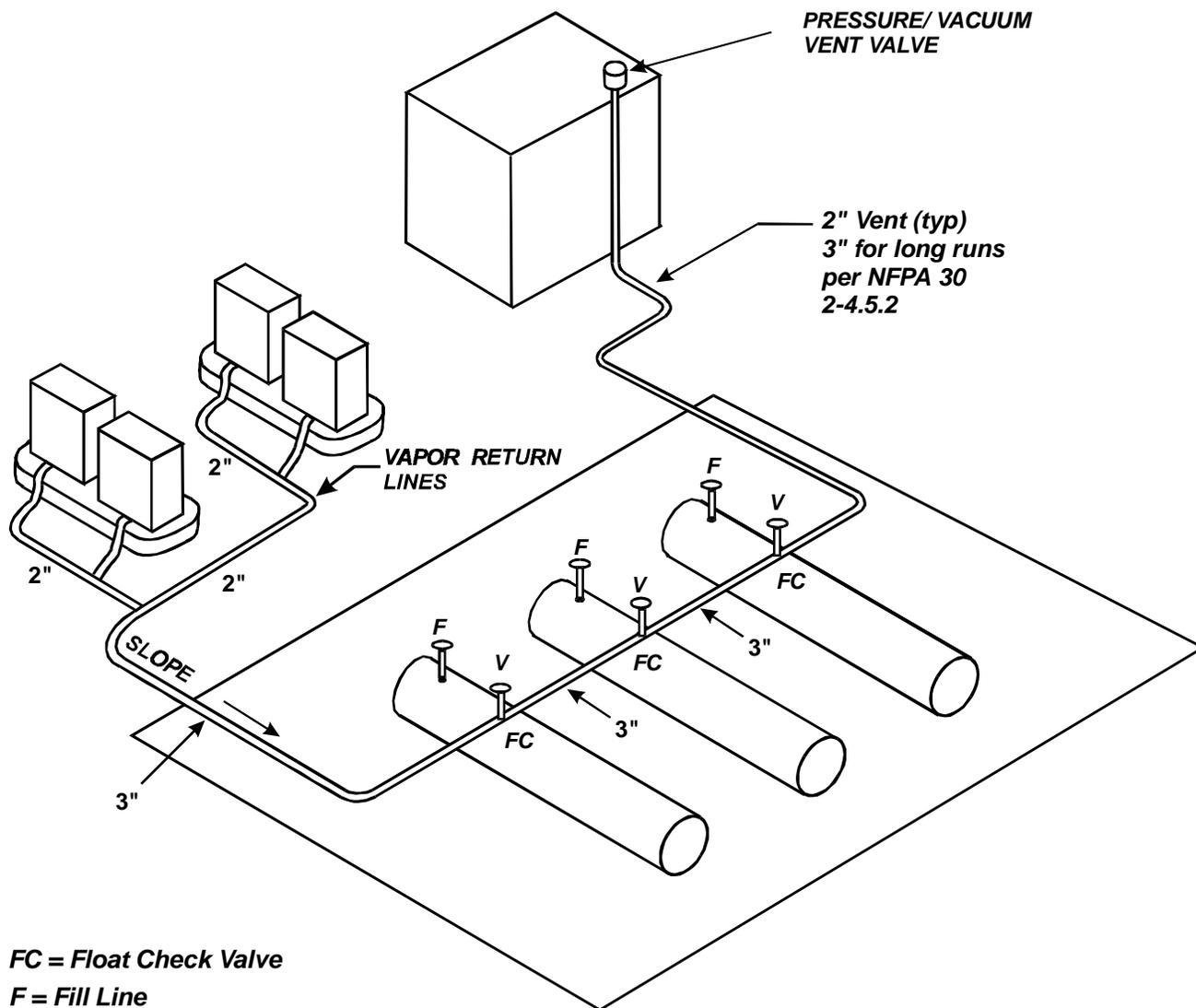
3. Maintain 2'0" Clearance Between Fill Line and
Phase I Vapor Return Line to Delivery Truck

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Exhibit 2

Figure 2A-5

Typical Installation of the
Healy Model 600 Phase I Vapor Recovery System
with Franklin Electric VP-1000 Vapor Pump



FC = Float Check Valve

F = Fill Line

V = Phase I Vapor Recovery

Note: 1. All Vapor/Vent Lines are 3" Nominal ID Minimum Except as Noted

2. Slope: 1/8" per foot Min.

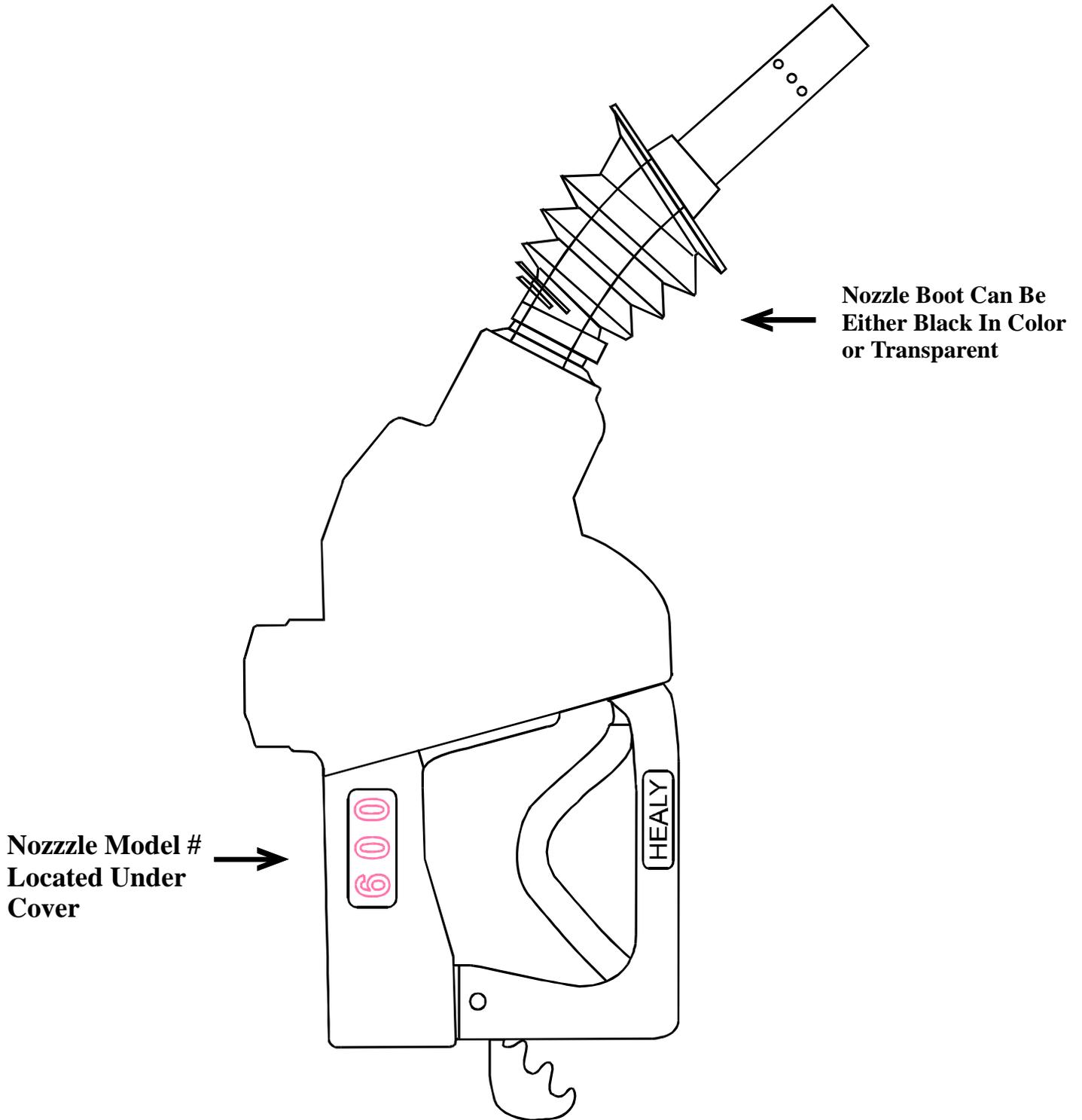
1/4" per Foot Preferred

**3. Maintain 2'0" Clearance Between Fill Line and
Phase I Vapor Return Line to Delivery Truck**

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Exhibit 2

Figure 2B-1

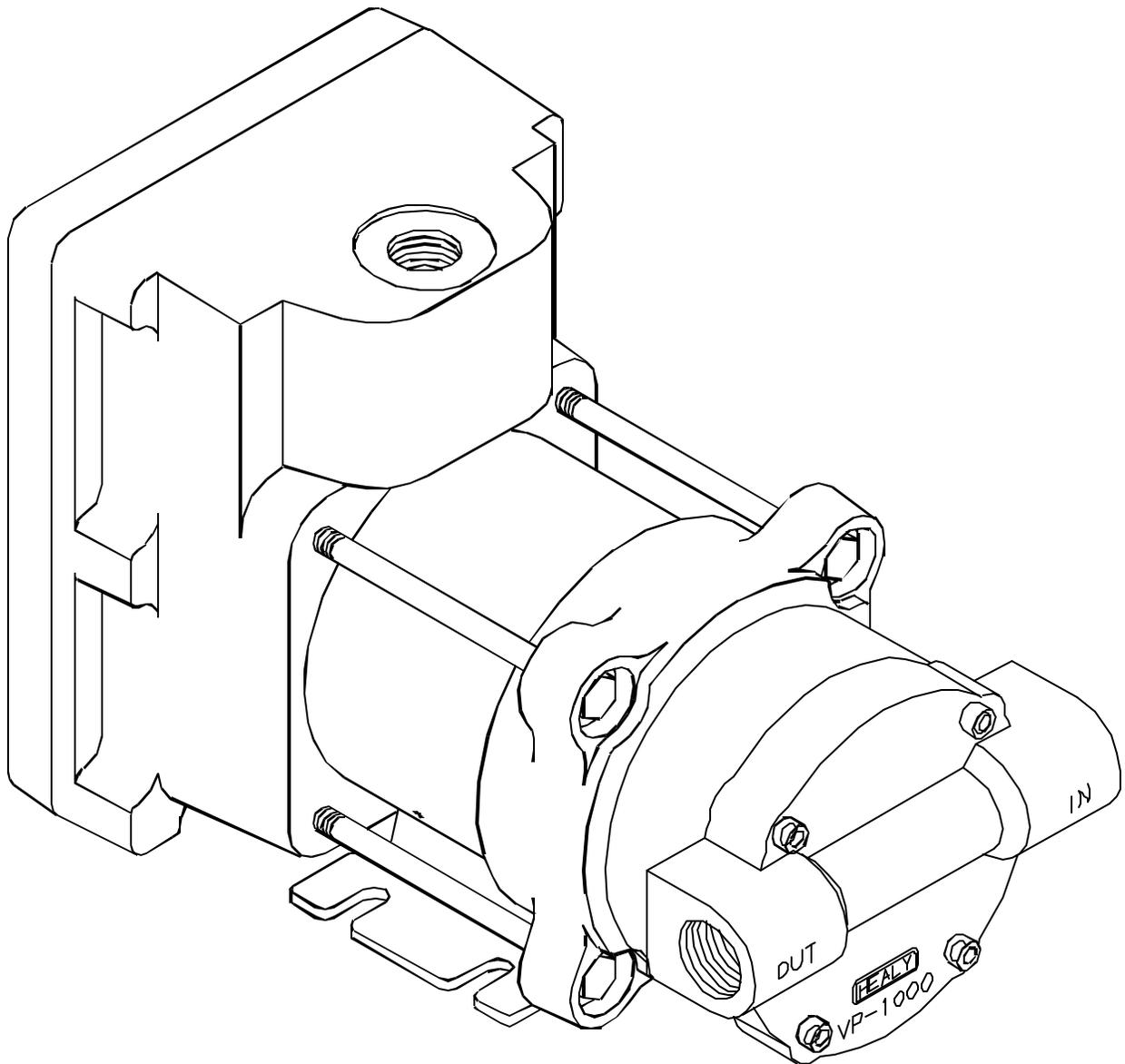


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Exhibit 2

Figure 2B-2

Franklin Electric VP1000 Vapor Pump



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EXHIBIT 3

STATIC PRESSURE INTEGRITY TEST UNDERGROUND STORAGE TANKS

1. APPLICABILITY

- 1.1 This test procedure is used to quantify the vapor tightness of vapor recovery systems installed at gasoline dispensing facilities (GDF) equipped with vacuum assist systems which require pressure/vacuum (P/V) valves, provided that the designed pressure setting of the P/V valves is a minimum of 2.5 inches of water column (inches H₂O). Excessive leaks in the vapor recovery system will increase the quantity of fugitive hydrocarbon emissions and lower the overall efficiencies of both the Phase I and Phase II vapor recovery systems.
- 1.2 Systems equipped with a P/V valve(s) allowed to have a designed cracking pressure less than 2.5 inches H₂O shall be bagged to eliminate any flow contribution through the valve assembly from the test results. The valve/vent pipe connection, however, shall remain unobstructed during this test.

2. PRINCIPLE

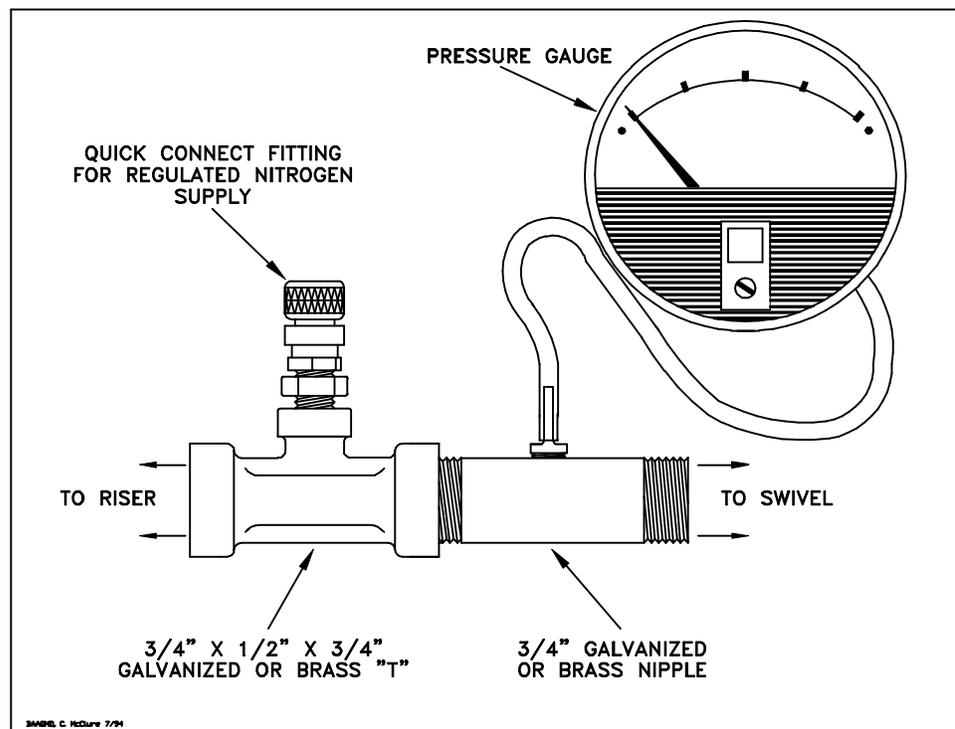
- 2.1 The entire vapor recovery system is pressurized with nitrogen to two (2.0) inches H₂O. The system pressure is then allowed to decay and the pressure after five (5) minutes is compared with an allowable value. The minimum allowable five-minute final pressure is based on the system ullage and pressure decay equations. For the purpose of compliance determination, this test shall be conducted after all back-filling, paving, and installation of all Phase I and Phase II components, including P/V valves, has been completed.
- 2.2 For GDF equipped with a coaxial Phase I system, this test shall be conducted at a Phase II vapor riser. For GDF which utilize a two-point Phase I system, this test may be conducted at either a Phase II riser or a Phase I vapor coupler provided that the criteria set forth in Section 6.7 have been met. If the integrity criteria for two-point systems specified in Section 6.7 are met, it is recommended that this test be conducted at the Phase I vapor coupler.

3. RANGE

- 3.1 If mechanical pressure gauges are employed, the full-scale range of the pressure gauges shall be 0-2.0, 0-1.0, and 0-0.50 inches H₂O column. Maximum incremental graduations of the pressure gauge shall be 0.05 inches H₂O and the minimum accuracy of the gauge shall be three percent of full scale. The minimum diameter of the pressure gauge face shall be 4 inches. A 0-2 inches H₂O inclined manometer, or equivalent, may be used provided that the minor scale divisions do not exceed 0.02 inches H₂O.

- 3.2 If an electronic pressure measuring device is used, the full-scale range of the device shall not exceed 0-10 inches H₂O with a minimum accuracy of 0.5 percent of full-scale. A 0-20 inches H₂O device may be used, provided the equivalent accuracy is not less than 0.25 percent of full scale.
- 3.3 The minimum and maximum total ullages shall be 500 and 25,000 gallons, respectively. These values are exclusive of all vapor piping volumes.
- 3.4 The minimum and maximum nitrogen feed-rates, into the system, shall be one (1) and five (5) CFM, respectively.

Figure 3-1
"T" Connector Assembly



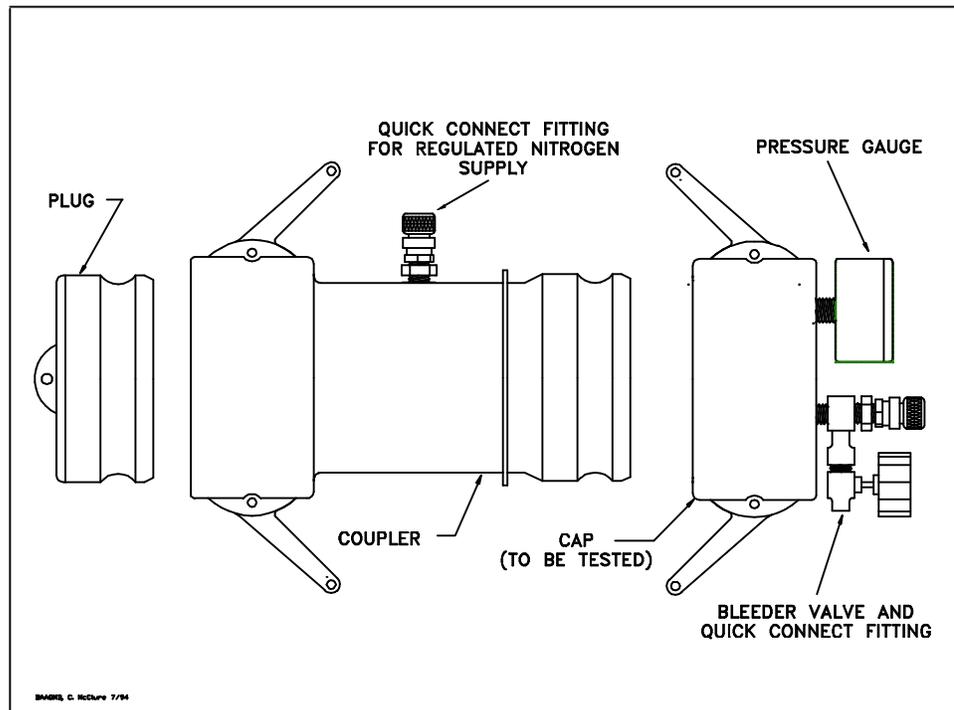
4. INTERFERENCES

- 4.1 Introduction of nitrogen into the system at flowrates exceeding five (5) CFM may bias the results of the test toward non-compliance. Only gaseous nitrogen shall be used to conduct this test. Air, liquified nitrogen, helium, or any gas other than nitrogen **shall not be used** for this test procedure.
- 4.2 The results of this Static Pressure Integrity Test shall not be used to verify compliance if an Air to Liquid Volumetric Ratio Test (Test Procedure TP-210.5 or equivalent) was conducted within the 24 hours prior to this test.

5. APPARATUS

- 5.1** Nitrogen. Use commercial grade nitrogen in a high pressure cylinder, equipped with a two-stage pressure regulator and a one psig pressure relief valve.
- 5.2** Pressure Measuring Device. Use 0-2.0, 0-1.0, and 0-0.50 inches H₂O pressure gauges connected in parallel, a 0-2 inches H₂O manometer, or an electronic pressure measuring device to monitor the pressure decay in the vapor recovery system. The pressure measuring device shall, at a minimum, be readable to the nearest 0.05 inches H₂O.
- 5.3** "T" Connector Assembly. See Figure 3-1 for example.
- 5.4** Vapor Coupler Integrity Assembly. Assemble Civacon 633-A, 633-B, and 634-A adapters, or equivalent, as shown in Figure 3-2. If the test is to be conducted at the storage tank Phase I vapor coupler, this assembly shall be used prior to conducting the static leak test in order to verify the pressure integrity of the vapor poppet. The internal volume of this assembly shall not exceed 0.1 cubic feet.

Figure 3-2
Vapor Coupler Integrity Assembly

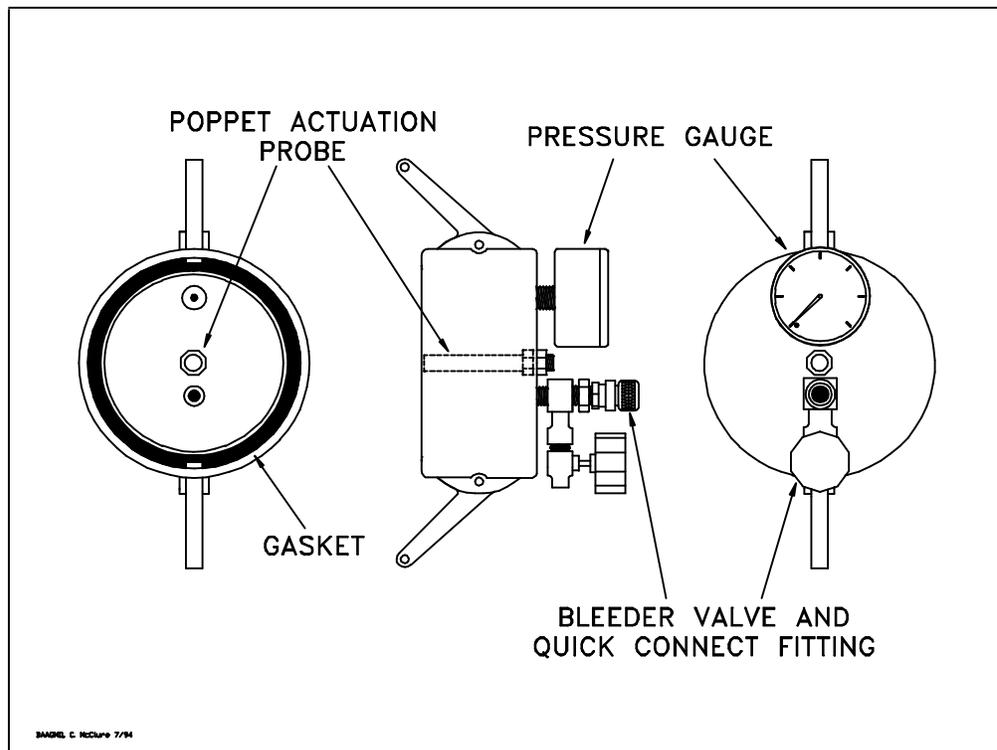


- 5.5** Vapor Coupler Test Assembly. Use a compatible Civacon 634-B cap, or equivalent, equipped with a center probe to open the poppet, a pressure measuring device to monitor the pressure decay, and a connection for the introduction of nitrogen into the system. See Figure 3-3 for an example.

- 5.6 Stopwatch. Use a stopwatch accurate to within 0.2 seconds.
- 5.7 Flowmeter. 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.
- 5.8 Combustible Gas Detector. A Bacharach Instrument Company, Model 0023-7356, or equivalent, may be used to verify the pressure integrity of system components during this test.
- 5.9 Leak Detection Solution. Any liquid solution designed to detect vapor leaks may be used to verify the pressure integrity of system components during this test.

Figure 3-3

Vapor Coupler Test Assembly



6. PRE-TEST PROCEDURES

- 6.1 The following safety precautions shall be followed:
 - 6.1.1 Only nitrogen shall be used to pressurize the system.
 - 6.1.2 A one psig relief valve shall be installed to prevent the possible over-pressurizing of the storage tank.
 - 6.1.3 A ground strap should be employed during the introduction of nitrogen into the system.

- 6.2** Failure to adhere to any or all of the following time and activity restrictions shall invalidate the test results:
 - 6.2.1** 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 .
 - 6.2.2** There shall be no product dispensing within thirty (30) minutes prior to the test or during performance of this test procedure.
 - 6.2.3** Upon commencement of the thirty minute “no dispensing” portion of this procedure, the headspace pressure in the tank shall be measured. If the pressure exceeds 0.50 inches H₂O, the pressure shall be carefully relieved in accordance with all applicable safety requirements. After the thirty minute “no dispensing” portion of this procedure, and prior to introduction of nitrogen, the headspace pressure shall again be lowered, if necessary, to less than 0.50 inches H₂O.
 - 6.2.4** There shall be no Air to Liquid Volumetric Ratio Test (Test Procedure TP-201.5) conducted within the twenty-four (24) hour period immediately prior to this test.
 - 6.2.5** The test shall be conducted with the station in normal operating mode. This includes all nozzles properly hung up in the dispenser boots and all dispenser cabinet covers in place. Exception: dispensing of product is disallowed as specified.
- 6.3** Measure the gallons of gasoline present in each underground storage tank and determine the actual capacity of each storage tank from facility records. Calculate the ullage space for each tank by subtracting the gasoline gallonage present from the actual tank capacity. The minimum ullage during the test shall be 25 percent of the tank capacity or 500 gallons, whichever is greater. The total ullage shall not exceed 25,000 gallons.
- 6.4** For two-point Phase I systems, this test shall be conducted with the dust cap removed from both the product and the vapor coupler. This is necessary to determine the vapor tightness of the Phase I vapor poppet. See Section 6.7 if this test is to be conducted at the Phase I vapor coupler.
 - 6.4.1** For coaxial Phase I systems, this test shall be conducted with the dust cap removed from the Phase I coupler. This is necessary to insure the vapor tightness of the Phase I vapor poppet.
 - 6.4.2** Verify that the liquid level in the storage tank is at least four (4) inches above the highest opening at the bottom of the submerged drop tube.
- 6.5** If the Phase I containment box is equipped with a drain valve, this test shall be conducted with the drain valve installed and the manhole cover removed. IF the drain valve is cover-actuated, the test shall be conducted once with the cover removed and repeated with the cover installed.

- 6.6** If the test is to be conducted at a Phase II vapor riser, disconnect the dispenser end of one vapor recovery hose and install the "T" connector assembly (see Figure 3-1). Connect the nitrogen gas supply (do not use air) and the pressure measuring device to the "T" connector.
- 6.6.1** For those Phase II systems utilizing a dispenser mounted remote vapor check valve, the "T" connector assembly shall be installed on the vapor riser side of the check valve.
- 6.7** If this test is to be conducted at the Phase I vapor coupler on a two-point Phase I system, the procedures set forth in subsections 6.7.1 and 6.7.2 shall be successfully completed prior to testing. The static pressure integrity test shall not be conducted at the Phase I coupler at facilities equipped with coaxial Phase I systems.
- 6.7.1** Connect the Vapor Coupler Integrity Assembly to the Phase I vapor coupler. Connect the Vapor Coupler Test Assembly. Connect the nitrogen supply to the assembly and carefully pressurize the internal volume of the assembly to two (2.0) inches H₂O. Start the stopwatch. Record the final pressure after one minute.
- 6.7.2** If the pressure after one minute is less than 0.25 inches H₂O, the leak rate through the Phase I vapor poppet precludes conducting the static leak test at this location. If the pressure after one minute is greater than or equal to 0.25 inches H₂O, the static leak test may be conducted at this location. This criteria assures a maximum leak rate through the Phase I vapor poppet of less than 0.0004 cubic feet per minute.
- 6.7.3** Disconnect the Vapor Coupler Integrity Assembly from the Phase I vapor coupler. If the requirements of subsection 6.7.2 were met, connect the Vapor Coupler Test Assembly to the Phase I vapor coupler.
- 6.7.4** Product may be poured onto the Phase I vapor coupler to check for leaks. This diagnostic procedure shall not be substituted for the procedures set forth in subsections 6.7.1 and 6.7.2.
- 6.8** All pressure measuring device(s) shall be bench calibrated using either a reference gauge or incline manometer. Calibration shall be performed at 20, 50, and 80 percent of full scale. Accuracy shall be within two percent at each of these calibration points. Calibrations shall be conducted on a frequency not to exceed 90 days.
- 6.9** Use the flowmeter to determine the nitrogen regulator delivery pressures which correspond to nitrogen flowrates of 1.0 and 5.0 CFM. These pressures define the allowable range of delivery pressures acceptable for this test procedure. Also record the regulator delivery pressure setting, and the corresponding nitrogen flowrate that will be used during the test. As an alternative, the flowmeter may be connected, in-line between the nitrogen supply regulator and Vapor Coupler Test Assembly, during the test.

- 6.10 Use Equation 9.2 to calculate the approximate time required to pressurize the system ullage to the initial starting pressure of two (2.0) inches H₂O. This will allow the tester to minimize the quantity of nitrogen introduced into those systems which cannot comply with the static leak standards.
- 6.11 Attach the Vapor Coupler Test assembly to the Phase I poppet or the "T" connector assembly to the Phase II vapor riser. Read the initial pressure of the storage tank and underground piping. If the initial pressure is greater than 0.5 inches H₂O, carefully bleed off the pressure, in accordance with all applicable safety procedures, in the storage tank and underground piping to less than 0.5 inches H₂O column.

7. TESTING

- 7.1 Open the nitrogen gas supply valve and set the regulator delivery pressure within the allowable range determined in Section 6.9, and start the stopwatch. Pressurize the vapor system (or subsystem for individual vapor return line systems) to **at least 2.2 inches H₂O** initial pressure. It is critical to maintain the nitrogen flow until the pressure stabilizes, indicating temperature and vapor pressure stabilization in the tanks. Check the test equipment using leak detecting solution or a combustible gas detector to verify that all test equipment is leak tight. Note: if a combustible gas detector is used to search for leaks, components which were certified with an allowable leak rate, such as 0.38 inches CFH at a pressure of two (2) inches, cannot be determined to be faulty solely on the basis of concentration registered on the instrument..
 - 7.1.1 If the time required to achieve the initial pressure of two (2.0) inches H₂O exceeds twice the time derived from Equation 9.2, stop the test and use liquid leak detector, or a combustible gas detector, to find the leak(s) in the system. Failure to achieve the initial starting pressure within twice the time derived from Equation 9.2 demonstrates the inability of the system to meet the performance criteria. Repair or replace the faulty component(s) and restart the test pursuant to Section 7.1.
- 7.2 Close and disconnect the nitrogen supply. Start the stopwatch when the pressure has decreased to the initial starting pressure of two (2.0) inches H₂O.
- 7.3 At one-minute intervals during the test, record the system pressure. After five minutes, record the final system pressure. See Table 3-I (or Equation 9.1) to determine the acceptability of the final system static pressure results. For intermediate values of ullage in Table 3-I, linear interpolation may be employed.
- 7.4 If the system failed to meet the criteria set forth in Table 3-I (or Equation 9.1), repressurize the system and check all accessible vapor connections using leak detector solution or a combustible gas detector. If vapor leaks in the system are encountered, repair or replace the defective component and repeat the test. Potential sources of leaks include nozzle check valves, nozzle vapor paths, pressure/vacuum relief valves, containment box drain valve assemblies, and plumbing connections at the risers.

7.4.1 If the facility fails to comply with the static leak test standards and the two point Phase I system utilizes overfill prevention devices in the drop tubes which were installed before July 1, 1993, and which are unable to pass the test with the dust caps removed from the fill adapters, the test may be conducted with the caps on the fill adapters. This exception is not intended to allow bleed holes in drop tubes. This exception expires on January 1, 2002, after which date all testing shall be conducted with the fill and vapor caps removed from two point systems. Under no circumstances may the test be conducted with the caps on coaxial Phase I couplers.

7.5 After the remaining system pressure has been relieved, remove the "T" connector assembly and reconnect the vapor recovery hose, if applicable.

7.6 If the vapor recovery system utilizes individual vapor return lines, repeat the leak test for each gasoline grade. Avoid leaving any vapor return line open longer than is necessary to install or remove the "T" connector assembly.

7.7 If the containment box has a cover-actuated drain valve, repeat the test with the cover in place. In these cases clearly specify, on Form 3-1, which results represent the pressure integrity with and without the cover in place.

8. POST-TEST PROCEDURES

8.1 Use Table 3-1 or Equation 9.1 to determine the compliance status of the facility by comparing the final five-minute pressure with the minimum allowable final pressure.

9. CALCULATIONS

9.1 The minimum allowable five-minute final pressure, with an initial pressure of two (2.0) inches H₂O, shall be calculated as follows:

[Equation 9-1]

$$\begin{aligned}
 P_f &= 2e^{\frac{-500.887}{V}} && \text{if } N = 1-6 \\
 P_f &= 2e^{\frac{-531.614}{V}} && \text{if } N = 7-12 \\
 P_f &= 2e^{\frac{-562.455}{V}} && \text{if } N = 13-18 \\
 P_f &= 2e^{\frac{-593.412}{V}} && \text{if } N = 19-24 \\
 P_f &= 2e^{\frac{-624.483}{V}} && \text{if } N > 24
 \end{aligned}$$

Where:

- N = The number of affected nozzles. For manifolded systems, N equals the total number of nozzles. For dedicated plumbing configurations, N equals the number of nozzles serviced by the tank being tested.
- P_f = The minimum allowable five-minute final pressure, inches H₂O

- V = The total ullage affected by the test, gallons
- e = A dimensionless constant approximately equal to 2.718
- 2 = The initial starting pressure, inches H₂O

9.2 The minimum time required to pressurize the system ullage from zero (0) to two (2.0) inches H₂O gauge pressure shall be calculated as follows:

$$t_2 = \frac{V}{[1522]F} \quad \text{[Equation 9-2]}$$

Where:

- t₂ = The minimum time to pressurize the ullage to two inches H₂O, minutes
- V = The total ullage affected by the test, gallons
- F = The nitrogen flowrate into the system, CFM
- 1522 = The conversion factor for pressure and gallons

9.3 If the policy of the local District requires an allowable tolerance for testing error, the minimum allowable five-minute final pressure, including testing error, shall be calculated as follows:

$$P_{f-E} = 2 - \left[1 + \left(\frac{E}{100} \right) \right] [408.9 - (P_f + 406.9)] \quad \text{[Equation 9-3]}$$

Where:

- P_{f-E} = The minimum allowable five-minute final pressure including allowable testing error, inches H₂O
- E = The allowable testing error, percent
- P_f = The minimum allowable five-minute final pressure calculated in Equations 9-1 or 9-2, inches H₂O
- 2 = The initial starting pressure, inches H₂O
- 408.9 = Atmospheric pressure plus the initial starting pressure, inches H₂O
- 406.9 = Atmospheric pressure, inches H₂O

10. REPORTING

10.1 The calculated ullage and system pressures for each five-minute vapor recovery system test shall be reported as shown in Form 3-1. Be sure to include the Phase I system type (two-point or coaxial), the Phase II system type, whether the system is manifolded, and the one-minute pressures during the test.

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TABLE 3-1

**Pressure Decay Leak Rate Criteria
Initial Pressure of 2 inches of H₂O
Minimum Pressure After 5 Minutes, inches of H₂O**

ULLAGE, GALLONS	NUMBER OF AFFECTED NOZZLES				
	01-06	07-12	13-18	19-24	> 24
500	0.73	0.69	0.65	0.61	0.57
550	0.80	0.76	0.72	0.68	0.64
600	0.87	0.82	0.78	0.74	0.71
650	0.93	0.88	0.84	0.80	0.77
700	0.98	0.94	0.90	0.86	0.82
750	1.03	0.98	0.94	0.91	0.87
800	1.07	1.03	0.99	0.95	0.92
850	1.11	1.07	1.03	1.00	0.96
900	1.15	1.11	1.07	1.03	1.00
950	1.18	1.14	1.11	1.07	1.04
1,000	1.21	1.18	1.14	1.10	1.07
1,200	1.32	1.28	1.25	1.22	1.19
1,400	1.40	1.37	1.34	1.31	1.28
1,600	1.46	1.43	1.41	1.38	1.35
1,800	1.51	1.49	1.46	1.44	1.41
2,000	1.56	1.53	1.51	1.49	1.46
2,200	1.59	1.57	1.55	1.53	1.51
2,400	1.62	1.60	1.58	1.56	1.54
2,600	1.65	1.63	1.61	1.59	1.57
2,800	1.67	1.65	1.64	1.62	1.60
3,000	1.69	1.68	1.66	1.64	1.62
3,500	1.73	1.72	1.70	1.69	1.67
4,000	1.76	1.75	1.74	1.72	1.71
4,500	1.79	1.78	1.77	1.75	1.74
5,000	1.81	1.80	1.79	1.78	1.77
6,000	1.84	1.83	1.82	1.81	1.80
7,000	1.86	1.85	1.85	1.84	1.83
8,000	1.88	1.87	1.86	1.86	1.85
9,000	1.89	1.89	1.88	1.87	1.87
10,000	1.90	1.90	1.89	1.88	1.88
15,000	1.93	1.93	1.93	1.92	1.92
20,000	1.95	1.95	1.94	1.94	1.94
25,000	1.96	1.96	1.96	1.95	1.95

Note: For manifolded Phase II Systems, the "Number of Affected Nozzles" shall be the total of all gasoline nozzles. For dedicated return configurations, the "Number of Affected Nozzles" shall be the total of those nozzles served by the tank being tested.

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EXHIBIT 4

TEN GALLON PER MINUTE LIMITATION COMPLIANCE VERIFICATION PROCEDURE

Compliance with the 10 gallon per minute flowrate limitation shall be determined with the following methodology. It is recommended that the maximum dispensing rate through each nozzle/hose assembly be verified.

1) The facility uses identical models of hoses, nozzles, and breakaways:

Check the nozzle closest to the submersible turbine pump (STP) for each gas grade, or STP, at the facility. With no other dispensing occurring which uses the same STP, dispense gas into a vehicle or approved container. Dispensing shall be conducted in the "hand-held, wide-open" mode. Using a stopwatch accurate to at least 0.2 seconds, begin timing the dispensing rate after at least one gallon has been dispensed. This one gallon buffer is necessary due to the "slow-start" nature of some dispensers. Determine the time required to dispense 2, 3, 4, or 5 gallons of gasoline. The facility shall be deemed in compliance with the 10 gallon per minute limitations if the elapsed time meets, or exceeds, the times shown in Table 1. If the dispensing rate exceeds the allowable limit, a CARB-certified flow limiting device shall be installed.

2) The facility uses different models of hoses, nozzles, or breakaways

Due to potential differences in pressure drops through the various components, each of the nozzle/hose assemblies shall be tested for maximum dispensing rates. Using the same criteria as above, determine the maximum dispensing rate through each nozzle/hose assembly. If the maximum dispensing rate exceeds the 10 gpm limit, a CARB-certified flow limiting device shall be installed.

Table 1
Verification of 10 gpm

Product Dispensed, gallons	Minimum Allowable Time, seconds
2.0	11.8
3.0	17.7
4.0	23.6
5.0	29.5

Note: The times have been corrected to allow for the accuracy of the measurement.

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EXHIBIT 5

ORVR COMPATIBLE NOZZLE FACTORY REBUILD PROGRAM

For period of four years after CARB has certified ORVR-compatible Healy nozzles, Healy Systems hereby offers to any owner of a nozzle which is part of a Healy Model 600 System, to replace the Healy nozzle with a CARB-certified, ORVR-compatible Healy nozzle. The modifications which are necessary to achieve compatibility with ORVR systems will be included with the replacement nozzle at no additional cost for the modification.

The customary \$65 list price core allowance will be applied to a standard reusable 600 nozzle body core as credit towards a factory rebuilt 600 ORVR-compatible nozzle at the same price and terms as a standard 600 rebuilt nozzle.