State of California
AIR RESOURCES BOARD

Executive Order G-70-186

Certification of the Healy Model 400 ORVR 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 Healy Model 400 ORVR Nozzle with central vacuum sources pursuant to the Certification Procedures and Test Procedures;

WHEREAS, the Healy Model 400 ORVR Vapor Recovery 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 Model 400 ORVR 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 Healy Model 400 ORVR System is certified to be at least 95 percent effective in attended and/or self-service mode when used with a CARB-certified Phase I system, as specified in Exhibits 1 and 2 of this Order. Fugitive emissions, which may occur when the underground storage tanks are under positive pressure have not been quantified and were not included in the calculation of system effectiveness. Exhibit 1 contains a list of the equipment certified for use with the Healy Model 400 ORVR System. Exhibit 2 contains installation and performance specifications for the system. Exhibit 3 contains a static pressure decay test for the Phase 1 system and vent piping. Exhibit 4 contains a static pressure decay test specifically for the Stage II piping network between the nozzle and the Healy Central Vacuum Unit. Exhibit 5 contains the Fillneck Vapor Pressure Regulation Fueling Test for the Healy Model 400 ORVR nozzle. Exhibit 6 contains the ten-gallon per minute compliance verification procedure.

NOW, THEREFORE, IT IS HEREBY ORDERED that the Healy Model 400 ORVR 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 has been verified. This system passed testing and evaluation of refueling ORVR-equipped vehicles.**

IT IS FURTHER ORDERED that the dispensing rate for installations of the Healy Model 400 ORVR 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 6.

IT IS FURTHER ORDERED that the following requirements are made a condition of certification. The Healy Model 400 ORVR System shall be installed only in facilities which are capable of demonstrating ongoing compliance with the vapor integrity requirements contained in Exhibits 3 and 4 of this Order. The owner or operator of the installation shall conduct, and pass, Static Pressure Decay tests as specified in Exhibits 3 and 4, 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, a Vapor Regulation Test as specified in Exhibit 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.**

IT IS FURTHER ORDERED that the Healy Model 400 ORVR 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 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 Healy Model 400 ORVR 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 the Healy ORVR compatible Model 400 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 central vacuum pump shall be adjusted and 100 percent performance checked at the factory, including verification that the vapor recovery system performance is within the range specified in Exhibit 2 of this Order. Central vacuum pumps sold separately as replacement parts shall be tested after field installation to verify that the vapor recovery system performance is within the range specified in Exhibit 2.

IT IS FURTHER ORDERED that Healy Model 400 ORVR System installations shall have a CARB-certified System monitor as specified in Exhibit 2 of this Order.

IT IS FURTHER ORDERED that the Healy Model 400 ORVR 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 for the Healy Model 400 ORVR System. Healy Systems or a factory authorized representative, shall provide to the station manager or other responsible individual, instructions in the proper use of the Healy Model 400 ORVR System, its repair and maintenance schedules, and locations where system and/or component replacements can be readily obtained. Copies of this Executive Order and installation and maintenance manuals for the Healy Model 400 ORVR System shall be stored at the facility. Revisions to the manual are subject to approval by CARB.

IT IS FURTHER ORDERED that the Healy Model 400 ORVR 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 Model 400 ORVR 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 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 October 26, 1998

Michael P. Kenny
Executive Officer

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Exhibit 1
Healy Model 400 ORVR Nozzle System
Equipment List

Component	Manufacturer/Model	State Fire Marshal Identification Number
Nozzle	Model 400 ORVR (w vapor valve) (Figure 1)	005:027:023
Vapor Pumps (Collection Unit)	9000 Mini-Jet Pump (non-electric gasoline-driven pump) 9000-01 without siphon 9000-02 with siphon (Figures 2A thru 2D)	005:027:009
	Thomas Industries VP-500 Vane Pump (1/2 hp) (Figure 3)	005:027:017
	Franklin Electric VP-500 Vane Pump (1/2 hp) (Figure 3)	
Vapor Check Valve	Healy Model 9466	005:027:024
System Monitor w Pressure Switch, Vent Sensor and P/V Valve	System Monitor Model 6280 Pressure Switch Model 93928 Vent Sensor Model 6275 (Figures 4A - 4G)	005:027:022
Inverted Coaxial Hoses	Healy Model 75B (3/4" I. D.)	005:027:003 005:027:004
	Healy Model 88B (7/8" I. D.)	005:027:005
	OR Any inverted coaxial hose CARB-certified for use with the Healy Model 400 ORVR system.	
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

Breakaway Couplings	Healy Model 8701VV	005:027:016
	Healy Model 8701 w/ 715V Upgrade Kit	005:027:016
Pressure/Vacuum Valves	OPW 523LP, 523LPS (settings as specified below)	005:008:051
	OPW 523V (settings as specified below)	005:008:058
	Hazlett H-PVB-1 Gold label (settings as specified below)	005:017:004
	Husky 4620 P/V (settings as specified below)	005:021:015
	Morrison Brothers 749CRB0600 AV (settings as specified below)	005:041:001
	EBW Models 802-309, 802-308	005:034:006
	OR Any CARB-certified valve with the following pressure and vacuum settings, in inches water column (wc): Pressure: three plus or minus one-half inches (3.0 ± 0.5") wc. Vacuum: eight plus or minus two inches (8 ± 2") wc.	
Flow Control Units	Healy Model 1301 or 1302	005:027:020
Phase I Adaptors	Any CARB-certified device which prevents loosening or overtightening of the Phase I product and vapor adaptors. **Note**: 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 MODEL 400 ORVR NOZZLE SYSTEM

Typical installations of the Healy system are shown in Exhibit 2, Figures 5A through 5F.

Nozzle

1. The Healy Model 400 ORVR nozzle has a normal operating pressure range at the nozzle boot/fillpipe interface of -1/4 to 0 inches water column (wc) with a range of +/-1/4 inches wc (total allowable range is -1/2 to +1/4 wc). Pressure readings shall be taken pursuant to Procedure 2 of TP-201.3. Readings taken during a fueling of at least 5 gallons, excluding the first two gallons and last one gallon dispensed, shall be within the total allowable range. Readings outside the specified range, except during the excluded beginning and ending gallons, indicate a defective nozzle. A vacuum which exceeds 1/2 inches wc, or a pressure which exceeds 1/4 inches wc, indicates a defective nozzle or system, and the nozzle shall be immediately removed from service. This test must be performed using a certified test system or non-ORVR equipped vehicles.
See Exhibit 5

Note: Vacuum or pressure levels outside of the specified range may occur during the beginning or end of the refueling operation when properly functioning equipment is affected by the following conditions: Gasoline dispensed into a vehicle fuel tank which is significantly warmer than the dispensed fuel may cause a vacuum of several inches. Conversely, gasoline dispensed into a vehicle tank, which is significantly cooler than the dispensed fuel may temporarily cause a pressure greater than 1/4 inches water column. The effect of temperature differential will be most pronounced at the beginning of the fueling operation and tend to gradually disappear toward the end of the fueling operation as fuel and vapor temperatures in the vehicle fuel tank equalize.

2. Nozzles shall be 100 percent performance checked at the factory, including checks of all shutoff mechanisms and of the integrity of the vapor path, and shall meet these specifications for the duration of the warranty. 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).

3. The Model 400 ORVR nozzle is certified as a replacement part for use in facilities that have the decertified Model 400 nozzle (revocation of certification by Executive Order G-70-180). The Model 400 ORVR nozzles may be installed as the decertified Model 400 nozzles reach the end of their useful lives, and the facilities in which these nozzles are installed may have a mixture of the original Model 400 nozzles and the Model 400 ORVR nozzles until April 17, 2001. Such facilities must be in compliance with all requirements and specifications of this Order by April 17, 2001.
See Exhibit 2, page 4, SYSTEM MONITOR.

Inverted Coaxial Hoses

1. The maximum length of the hose shall not exceed 13 feet, provided that all hoses meet the following requirements:

   A. 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 refueling point.

   B. A certified swivel is required at the nozzle end of the coaxial hose. A certified swivel on the dispenser end is optional.

Inverted Coaxial Hose Adapters

1. Inverted coaxial hose adapters shall be 100 percent performance checked at the factory to verify that they are 100% vapor tight. Adapters shall be maintained vapor tight.

Breakaway Couplings

1. Breakaway couplings shall be installed. Only certified breakaways with a valve that closes the vapor path when separated may be used. Any fueling point that does not have a breakaway which is CARB-certified for use with this system, and which does not contain a valve which closes the vapor path when separated, shall be cause for the local district to issue a notice to comply pursuant to Health and Safety Code Section 41960.2 (e).

Central Vacuum Unit

1. The Healy Model 400 ORVR system shall operate with at least one of the central vacuum units (pumps) specified in Exhibit 1.
(See Exhibit 2, Figures 2A-2D and Figure 3).

2. No dispensing shall be allowed when the central vacuum unit is disabled for maintenance or for any other reason unless the facility is operating under a district variance or upset/breakdown rule provision.

3. A threaded NPT tap of either 1/8” or 1/4” in diameter shall be provided on the inlet side of the central vacuum unit. The tap shall remain plugged and vapor tight except when test equipment is being connected or removed. The system shall not be allowed to operate when the tap is not vapor tight.

4 The normal vacuum levels observed during the efficiency testing of the Healy System with the three collection units are listed below (in inches of water column). The test was conducted at a site equipped with four multi-product dispensers (i.e. 8 fueling points.).

Based on the performance curves for each pump, the maximum number of fueling points that can be supported by each central vacuum unit is listed below. This number is based on an in use factor of (50%) and a demonstration of the maximum number of fueling points which can be operated simultaneously while the nozzles maintain vacuum levels within the normal operating range. The local district may require a demonstration of nozzle performance with the maximum number of simultaneous fueling points in operation. (See Exhibit 5.)

Central Vacuum Unit	Maximum Number Of Fueling Points	Maximum Number of Simultaneous Fueling Points	Normal Operating Range For Vacuum Level	Vacuum Level Observed During Testing
Healy 9000 Mini-Jet Pump	**8**	**4**	**65” to 85” wc**	**68” to 79” wc**
Thomas Industries / Franklin Electric VP 500 Vane Pump	**10**	**5**	**65” to 85” wc**	**70” to 82” wc**

The system shall operate within the vacuum level ranges specified above. Observation of a vacuum level below the specified range, for more than three seconds, measured while dispensing is occurring, is considered a failure of the system. For low vacuum levels less than 65 but greater than 60, a notice to comply shall be issued by the local District pursuant to Section 41960.2(e) of the Health and Safety Code. For low vacuum levels less than or equal to 60, all affected nozzles shall be tagged “Out of Order” pursuant to Section 41960.2(d).

For observation of vacuum levels above the specified range, the district shall issue a Notice to Comply pursuant to Health and Safety Code Section 41960.2 (e) for vacuum levels greater than 85 but less than 90. If the vacuum range is greater than or equal to 90, all affected nozzles shall be tagged “Out of Order” pursuant to Section 41960.2(d) of the Health and Safety Code.

To increase the maximum number of fueling points in a gasoline dispensing facility, two or more central vacuum units may be installed in parallel to maintain the necessary vacuum for the system as per manufacturer's instructions. The local district may require verification that the system can operate within the specified vacuum range with the maximum number of nozzles which may be used simultaneously.

5. A valve (such as a non-restrictive ball valve) shall be installed in the vapor return line such that the lines can be isolated from the underground storage tanks for the purpose of conducting the Vacuum Return Line Integrity Test as specified in Exhibit 4. **The valve shall remain open at all times except when the test is being conducted**. No product shall be dispensed when this valve is closed.

6. OSHA acceptable access to the central vacuum unit shall be provided immediately upon request for the purpose of inspection and testing.

9466 Check Valve

1. The 9466 Check Valve is an integral part of the vapor lines subject to high vacuum levels and its purpose is to slow the rate of vacuum decay in the vapor return lines after the vacuum source has shut off. This in turn decreases the ramp-up time necessary for the system to reach operating vacuum level when the system is re-energized. In larger stations with longer vapor return lines and greater internal volumes, the vapor check valve reduces the number of false "Low Vacuum" alarms recorded by the system monitor. The 9466 Check Valve is an integral part of the system and shall not be removed or bypassed during testing of the system.

System Monitor

The Healy Model 400 ORVR system shall have a system monitor. Existing facilities that have the decertified Healy 400 System shall be in compliance with all requirements and specifications of this Order by April 17, 2001. The system monitor shall be installed in existing facilities once 50% of the decertified Healy 400 nozzles have been replaced by the Model 400 ORVR nozzles or by April 17, 2001, whichever comes first. See Exhibit 2, Figures 4A through 4G.

System Monitor Vacuum Sensor

1. The monitor shall have a power light indicating the monitor has power at all times. The vacuum monitor portion shall have three system indicator lights. One light shall indicate that the vapor recovery system "motor" has power. The other two lights shall indicate the system is operating within either "normal" or "low" vacuum levels.

2. The monitor shall be set to light the "low" vacuum indicator at the beginning of dispensing when the system vacuum level is below sixty-five inches water column (65" WC). The run light shall be set to light when 65 inches water column or higher vacuum is present. The monitor shall sound an alarm and record a **vacuum failure** when the following condition occurs.

   The pressure switch does not sense sixty-five inches of vacuum being created within fifteen seconds of the time from which the system is energized for **three** consecutive dispensings, under normal operating conditions. Normal operating conditions defined as: All system components being installed and operating as specified in Exhibit 2.

Note: A normally operating system may, at times, fail to achieve the minimum 65" w.c. vacuum within the allowable fifteen seconds. This may occur when the system is initialized with little or no vacuum present in the Stage II piping network between the nozzles and the Healy Central Vacuum Unit. This in not an indication of a system failure unless it occurs for **three** consecutive dispensings under normal operating conditions. If the system fails to achieve the minimum vacuum of 65" w.c. for three consecutive refueling events, the local district shall use the enforcement criteria specified in Item 4 of the Central Vacuum Unit section of this document.

3 The system shall operate within the vacuum level range specified for each Healy Central Vacuum Unit. Observation of vacuum levels below the specified range, for more than three seconds, measured while dispensing is occurring, is considered a no-vacuum failure of the system. The low "vacuum" indicator light will flash on the monitor. The monitor shall sound an alarm and record a **no-vacuum failure** after one hour of a low vacuum condition. For observation of vacuum levels above the specified range, the local district shall use the enforcement criteria specified in Item 4 of the Central Vacuum Unit section of this document.

4 The system monitor shall be located in an area that is visible to station personnel while at their common workplace. The pressure sensor shall be capable of measuring the true vapor line vacuum and shall be installed in a location that will not cause interferences with normal flow characteristics.

System Monitor Vent Sensor

1. The Healy Model 400 ORVR system generates a high vacuum level in the vapor return lines. Any defect, which compromises the integrity of the vapor lines from the nozzles to the central vacuum unit, may cause the system to ingest large amounts of air. Excess air in the storage tanks causes excessive vent emissions when the pressure exceeds the pressure setting of the P/V vent valve (3" WC +/- 0.5" WC). The System Monitor shall, at a minimum, create a permanent record of system operation and ensure that leaks, which may cause excess emissions, will be detected.

2. The vent-sensing portion of the system monitor shall have two indicator lights. The vent light shall be set to light when venting is occurring. The excess light will be illuminated and the alarm will sound after ten hours of venting have has been recorded in a calendar day.

Monitor Maintenance Log Requirement

Any loss of integrity in the Stage II piping network between the nozzle and the Healy Central Vacuum Unit may cause excessive vent emissions which could trigger a VENT failure and/or VAC failure alarm condition detected by the Healy System Monitor. The Healy System Monitor, Model #6280, was developed to assure that such problems are quickly detected. The out of tolerance conditions the Monitor is designed to detect will cause a continuous audible alarm condition, the alarm may be silenced with a reset button, but will resound every four hours until the cause has been corrected. The station owner/operator shall call for maintenance within 24 hours of the initial alarm sounding and shall maintain a log of all alarms events and corresponding maintenance actions. This log shall be kept on site at all times and shall contain, at a minimum, the following information:

1. Date and Time of Alarm.
2. Type of Alarm(s).
3. Date and Time of Call for Maintenance.
4. Date Maintenance Performed.
5. Maintenance Contractors Name and Phone Number.
6. Maintenance Performed
   a. Test(s) Conducted.
   b. Test Results
   c. Components(s) Repaired or Replaced.

Test results, which document failures, shall be submitted for the purpose of tracking the performance of the system. Such test results shall not be a basis for any enforcement action, provided that the final test conducted demonstrates compliance with the specifications of certification.
Whenever a district finds a station in an alarm condition during an inspection, and the alarm condition is less than 24 hrs old, or the system has been in an alarm condition for no more than 72 hours and a call for maintenance has been placed, the district shall issue a Notice to Comply pursuant to Health and Safety Code Section 41960.2 (e).

Whenever the district finds a record of an alarm condition, if the operator provides the district, within seven days, with adequate evidence that the system was either restored to good working order within three days of the initial alarm, or was shut down and did not dispense fuel in the alarm condition, the operator shall not be subject to liability for the alarm condition provided any one of the following conditions are met:

1. The facility shut down and did not dispense fuel after the alarm sounded.

2. Maintenance, such as replacement of pressure indicator, was performed to correct a failure of the monitoring system, and there is no evidence of a loss of integrity in the high vacuum portion of the system or a failure of the system to collect vapor.

3. Failure to achieve the minimum vacuum level and/or a loss of integrity in the high vacuum portion of the system has not previously occurred within the last three months.

4. The system was in an alarm condition for one day, but the alarm condition did not occur on the following day, and diagnostic testing of the high vacuum portion found no loss of integrity with no maintenance being performed to the high vacuum portion of the system or to the vacuum source. Occasionally, an alarm condition is caused by something other than a failure of the Healy system. A Phase I delivery in which either a faulty Phase I system on the delivery tank, or incorrect procedures used by the driver, may cause the storage tank to pressurize. The district shall determine if a defective cargo tank is the cause and shall investigate repeated occurrences.

Note: Episodes of venting which are recorded but which do not exceed ten hours in a 24 hour period are not an indication of failure of the system and shall not be the basis for enforcement action. Venting which occurs through the 2” wc pressure valve is very low in volume and may occur from time to time during normal operation.

The following may result in a Notice of Violation issued by the local district:

Failure to call for maintenance within 24 hours of the initial alarm.

Failure to maintain the log as specified above.

Failure to log in alarm and/or corresponding maintenance action within 7 days of alarm event.

More than one alarm condition in a three-month period for which maintenance was necessary to correct a leak in the high-vacuum portion of the system, and/or to raise the vacuum level above the required minimum level.

Vapor Recovery Piping Configurations

1. The maximum allowable pressure drop through the system, measured at a flow rate of 60 SCFH with dry Nitrogen gas, shall not exceed 0.50 inches water column. The pressure drop from the dispenser to the underground storage tank shall be measured so as to eliminate a blockage, which may be caused by the central unit in one of the following ways:

   If the central vacuum unit is located in the turbine pit, the pressure drop shall be measured from the dispenser riser to the central vacuum unit inlet

   If the central vacuum unit is not located in the turbine pit, the pressure drop shall be measured as indicated above and the pressure drop measured from the central vacuum unit outlet to the storage tank with the poppetted Phase I vapor connection open shall be measured and the results summed.

1. The recommended nominal inside diameter of the underground Phase II plumbing is as indicated in Exhibit 2, Figures 5A-5F. 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. The above ground vent manifold may be used as an alternative to the underground manifold **only in existing installations** where the vapor piping is already installed, and where the installation does not expose the tanks, and is not approved for use in for new stations.

2. 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 storage tank or Phase II line low point. 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.

3. All vapor return lines shall slope a minimum of 1/8 inch per foot. A slope of 1/4 inch or more per foot is recommended wherever feasible.

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

Underground Storage Tank (UST) Pressure

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

1. The Healy Model 400 ORVR system was observed to have normal operating tank pressures less than 1-inch water column. Pressures that are consistently above the normal tank pressure levels, particularly pressures, which correlate with periods of vehicle fueling, may indicate system malfunction. In the event that high pressures in the storage tank are observed consistently, the owner or operator of the installation shall conduct, and pass, the Vacuum Return Line Integrity Test as specified in Exhibit 4 of this Order. Test results shall be made available to the district upon request within fifteen days after the test is conducted, or within fifteen days of the request. Alternative test procedures may be used if determined by the Executive Officer to yield comparable results. The local district may require the facility to cease operations when the integrity of the vapor lines is compromised.

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 system. 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 400 ORVR 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 ongoing 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 that have drain valves shall demonstrate compliance with the static pressure decay criteria with the drain valves installed as in normal operation.
3. Phase I Vapor Return spill containment manholes shall not have spring loaded drain valves installed. Existing facilities in which drain valves are installed may be plugged.

4. 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, and provided that the connection of the vapor hose to the cargo tank does not open the headspace to atmosphere, 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 vapor valve 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 delivery tank vapor valve is closed after the product valve is closed, and

   The vapor return hose is disconnected from the facility storage tank before it is disconnected from the delivery tank.

5. All Phase I adapters, fittings and connections shall be maintained vapor tight. Whenever the local district finds a leak by using a commercial leak detection solution, the district may issue a notice to comply, pursuant to Health and Safety Code Section 41960.2 (e).

6. 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.

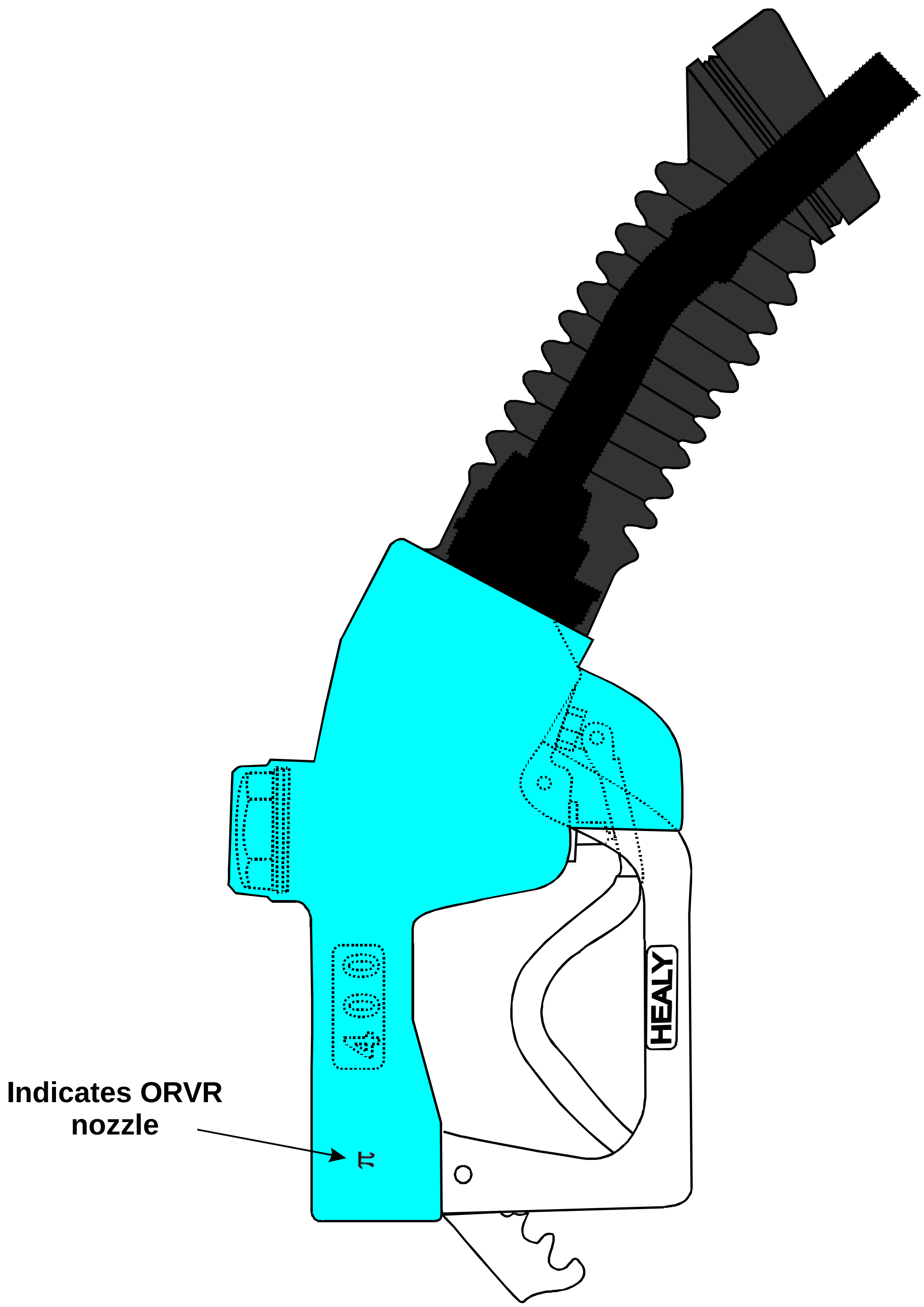
7. Manholes shall be maintained in a color, which minimizes solar gain, as specified above. Manhole covers, which are color coded for product identification, are exempted from this requirement.

Dispensing Rate

1. The dispensing rate for installations of the Healy Model 400 ORVR 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 6.

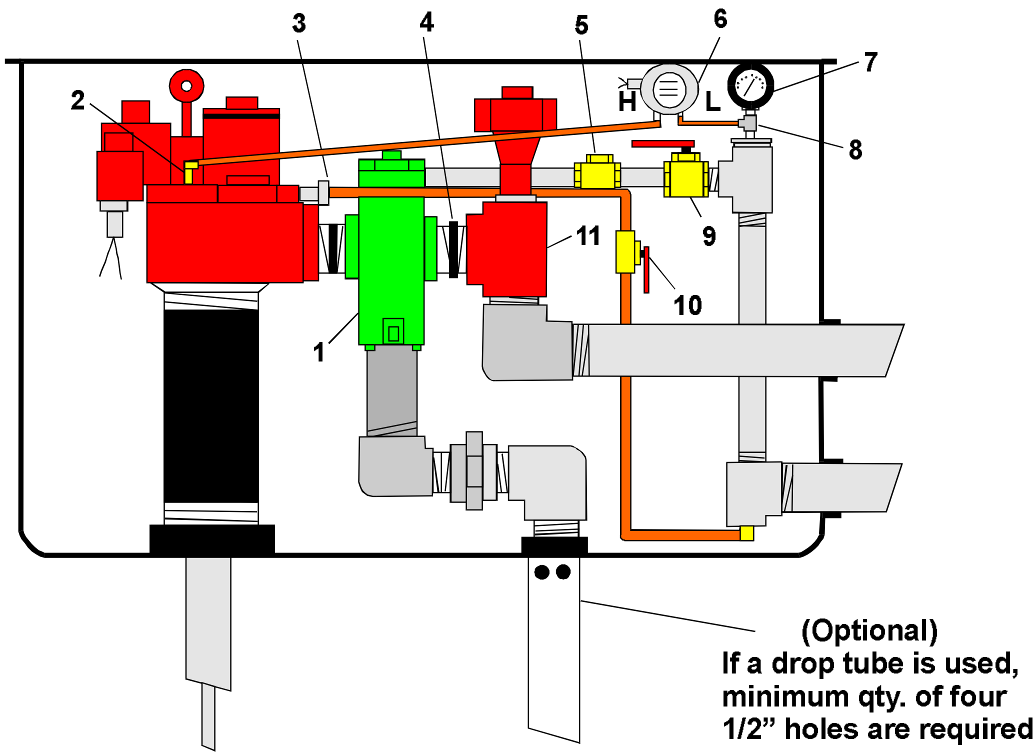
Executive Order G-70-186
Exhibit 2
Figure 1

Healy 400 ORVR Nozzle



Executive Order G-70-186
Exhibit 2
Figure 2A

9000-01 MINI-JET INSTALLATION WITH RED JACKET PUMP

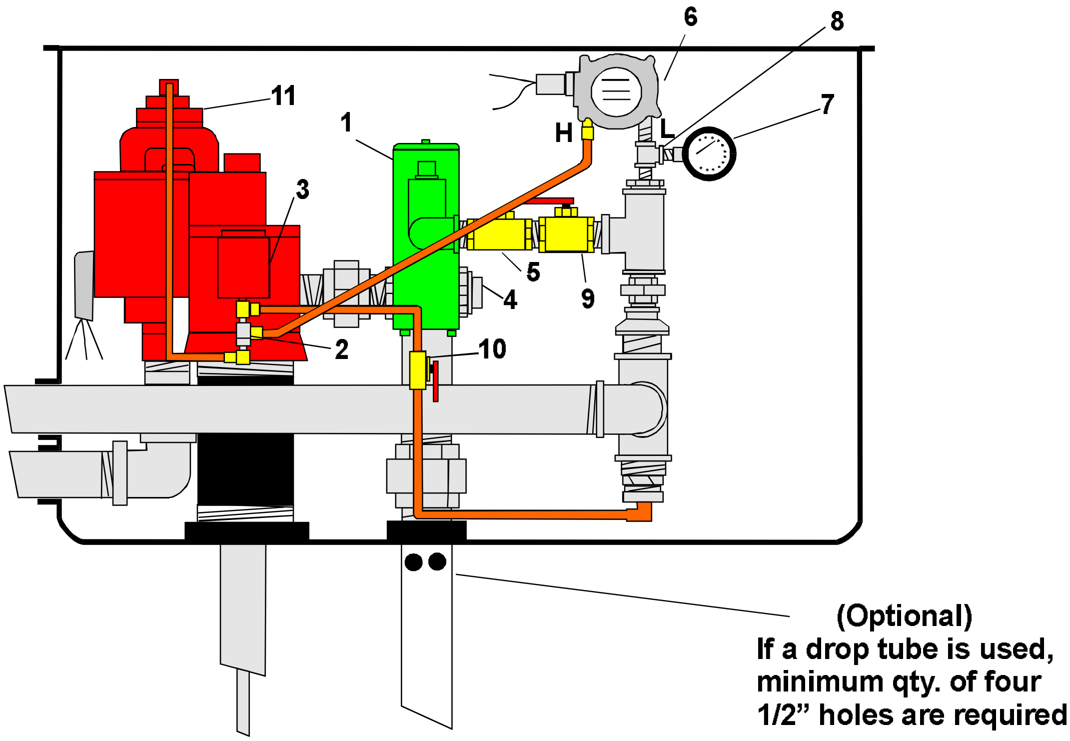


Below is a list of required items in a typical 9000-01 Mini-Jet sump installation.

1. 9000-01 Mini-Jet, Healy Systems Central Vacuum Source
2. ¼" Tank Test Port, Red Jacket
3. Syphon Valve, Red Jacket
4. Universal Check Valve #212BPR (or equivalent)
5. Condensate Drain Check Valve #9466, Healy Systems
6. Pressure Switch #93928, Healy Systems
7. W.C. Vacuum Gage, 0" to 100" (FOR TESTING ONLY)
8. ¼" TEE for vacuum gage test port
9. 1" Ball Valve, U L listed
10. ¼" Ball Valve, U L listed
11. Leak Detector TEE Housing, Red Jacket

Executive Order G-70-186
Exhibit 2
Figure 2B

9000-01 MINI-JET INSTALLATION WITH FE PETRO PUMP

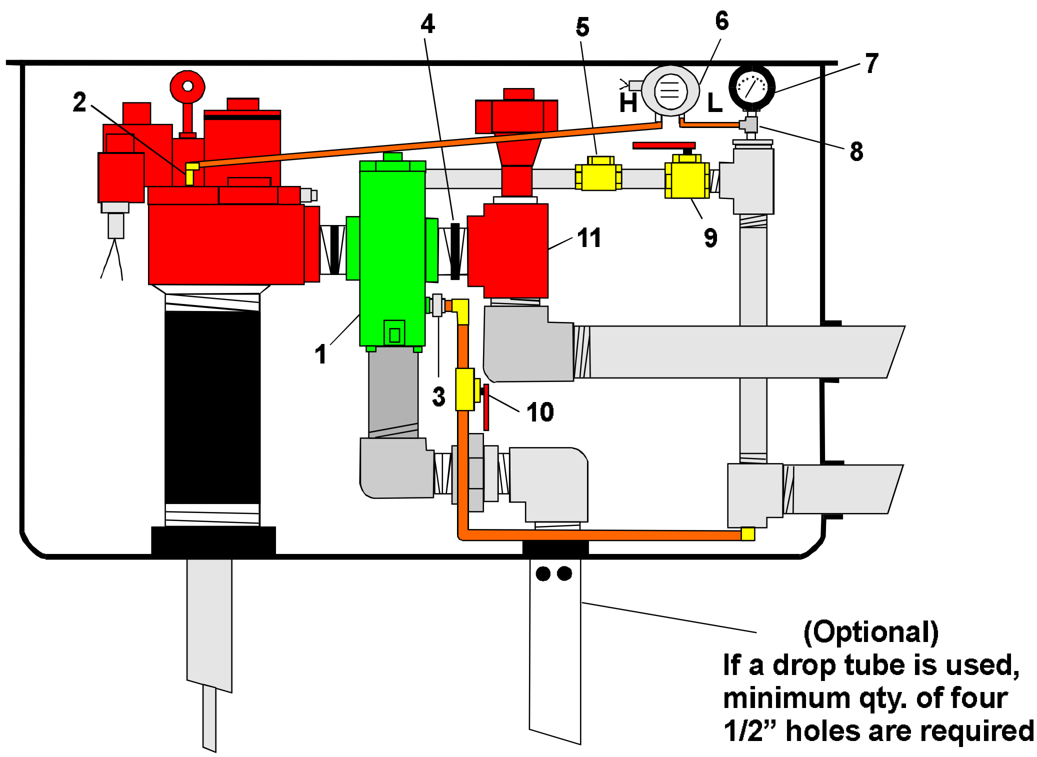


Below is a list of required items in a typical 9000-01 Mini-Jet sump installation.

1. 9000-01 Mini-Jet, Healy Systems Central Vacuum Source
2. 1/4" Tank Test Port, FE Petro
3. Syphon Valve, FE Petro
4. 2" Pipe Plug
5. Condensate Drain Check Valve #9466, Healy Systems
6. Pressure Switch #93928, Healy Systems
7. W.C. Vacuum Gage, 0" to 100" (FOR TESTING ONLY)
8. 1/4" TEE for vacuum gage test port
9. 1" Ball Valve, U L listed
10. 1/4" Ball Valve, U L listed
11. F. E. Petro Leak Detector

Executive Order G-70-186
Exhibit 2
Figure 2C

9000-02 MINI-JET INSTALLATION WITH RED JACKET PUMP

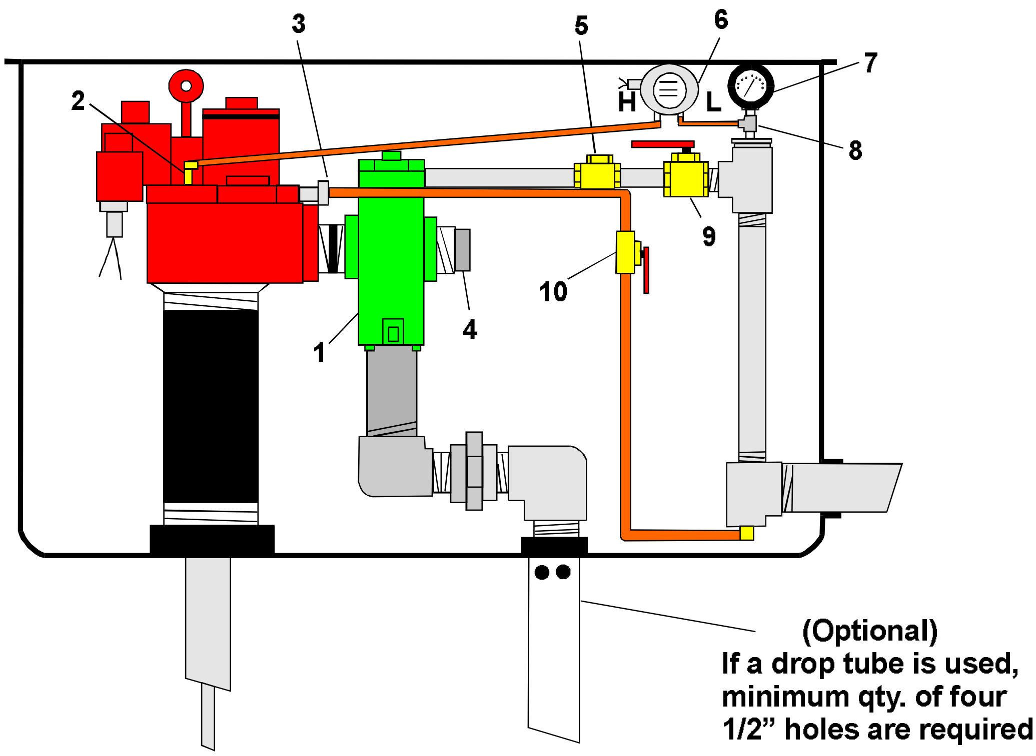


Below is a list of required items in a typical 9000-02 Mini-Jet sump installation.

1. 9000-02 Mini-Jet, Healy Systems Central Vacuum Source
2. ¼" Tank Test Port, Red Jacket
3. Syphon Valve, Red Jacket
4. Universal Check Valve #212BPR (or equivalent)
5. Condensate Drain Check Valve #9466, Healy Systems
6. Pressure Switch #93928, Healy Systems
7. W.C. Vacuum Gage, 0" to 100" (FOR TESTING ONLY)
8. ¼" TEE for vacuum gage test port
9. 1" Ball Valve, U L listed
10. ¼" Ball Valve, U L listed
11. Leak Detector TEE Housing, Red Jacket

Executive Order G-70-186
Exhibit 2
Figure 2D

9000-01 MINI-JET INSTALLATION WITH RED JACKET PUMP (DEDICATED STP)

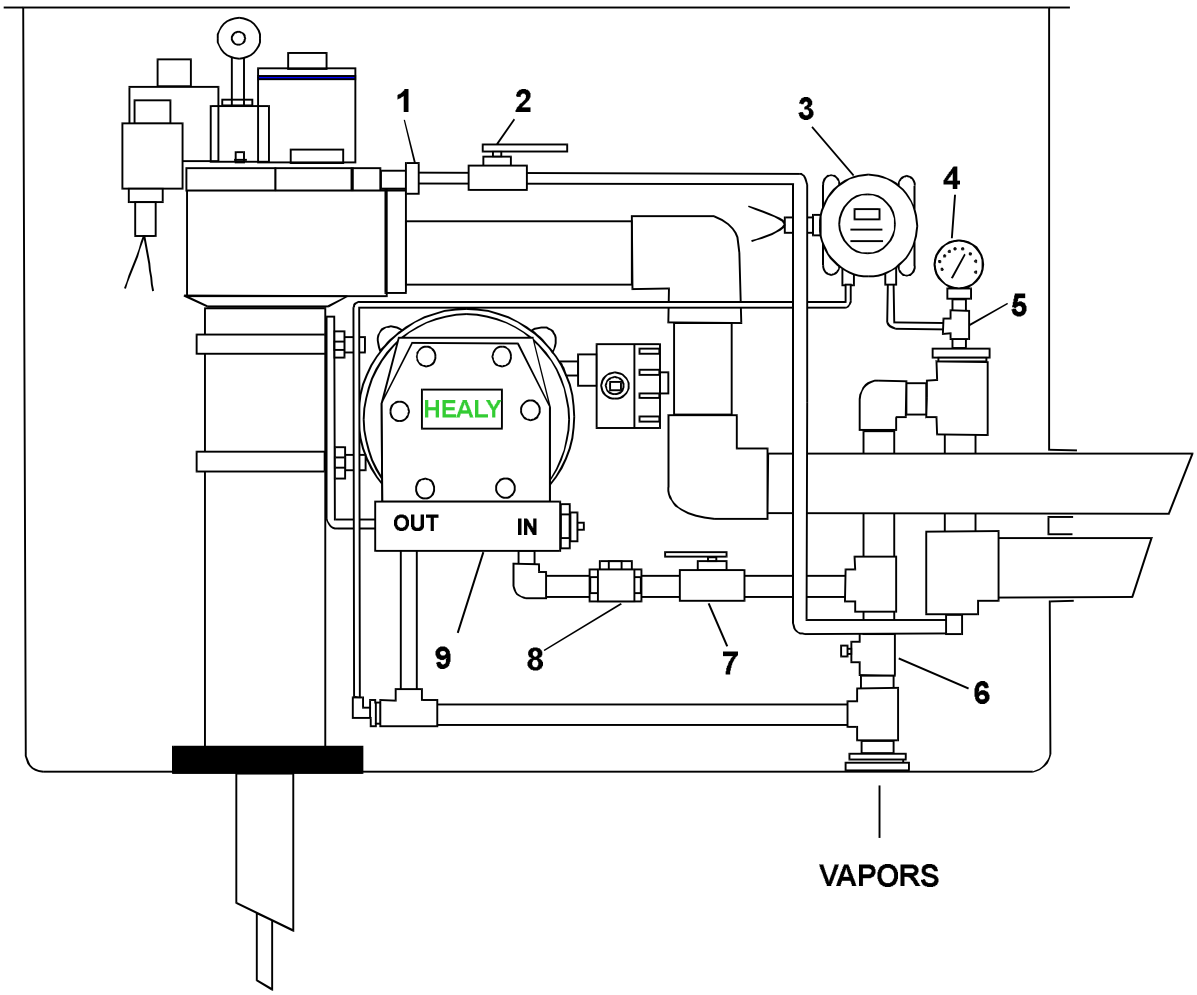


Below is a list of required items in a typical 9000-01 Mini-Jet sump installation.

1. 9000-01 Mini-Jet, Healy Systems Central Vacuum Source
2. ¼" Tank Test Port, Red Jacket
3. Syphon Valve, Red Jacket
4. 2" Pipe Plug
5. Condensate Drain Check Valve #9466, Healy Systems
6. Pressure Switch #93928, Healy Systems
7. W.C. Vacuum Gage, 0" to 100" (FOR TESTING ONLY)
8. ¼" TEE for vacuum gage test port
9. 1" Ball Valve, U L listed
10. ¼" Ball Valve, U L listed

Executive Order G-70-186
Exhibit 2
Figure 3

VP500 CENTRAL VACUUM VANE PUMP (TYPICAL SUMP INSTALLATION)

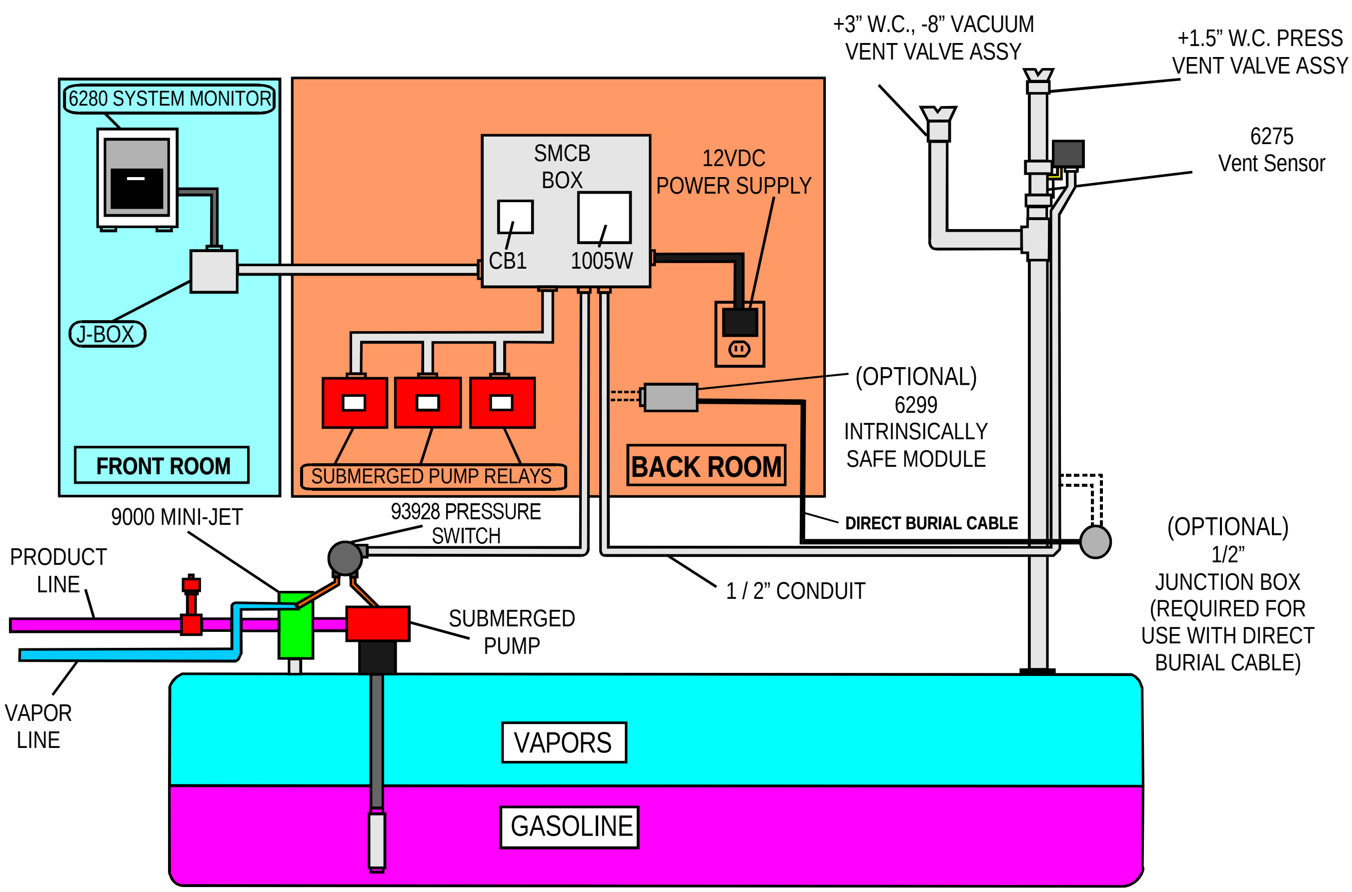


Below is a list of required items in a typical VP500 Vane Pump sump installation.

1. Syphon Valve, Red Jacket
2. 1/4” Ball Valve, UL listed
3. Pressure Switch #93928, Healy Systems
4. W.C. Vacuum Gage, 0” to 100” (FOR TESTING ONLY)
5. 1/4” TEE for vacuum gage test port
6. 1” Ball Valve, UL listed (USUALLY CLOSED, OPEN FOR TESTING ONLY)
7. 1” Ball Valve, UL listed
8. Condensate Drain Check Valve #9466, Healy Systems
9. VP500 Central Vacuum Vane Pump, Healy Systems

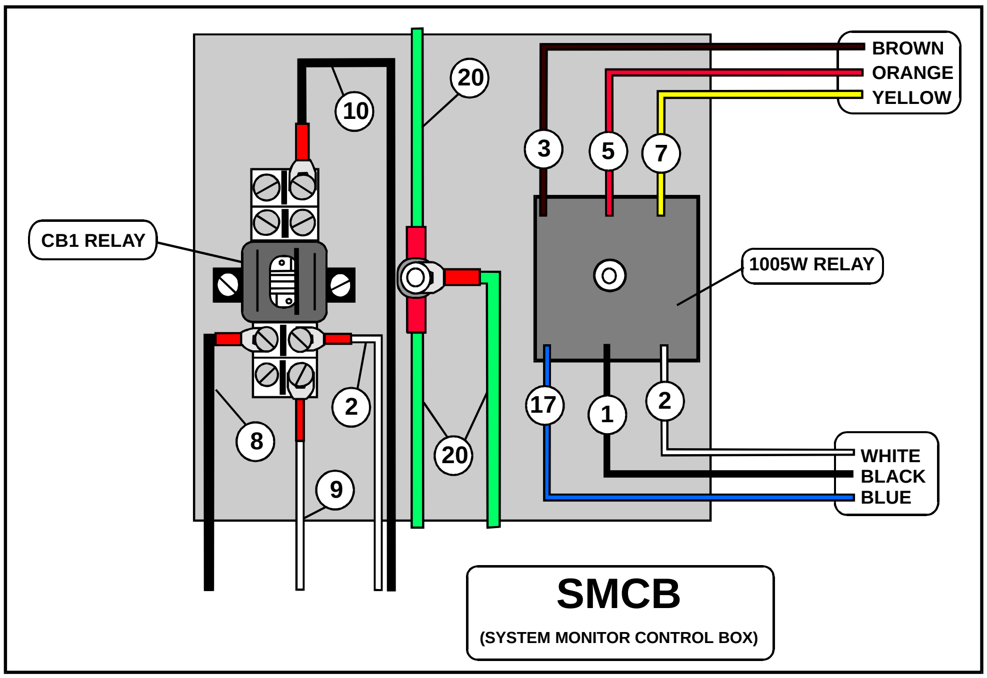
Executive Order G-70-186
Exhibit 2
Figure 4A

Healy Monitoring System Layout



SMCB

(SYSTEM MONITOR CONTROL BOX)



System Monitor Control Box. The SMCB is a junction box for the CB1 relay and the 1005W solid state relay. It also acts as a junction box for the wiring cable supplied from the 6280 System Monitor, the 12VDC plug-in power supply, field wiring from the 93928 Differential Pressure Switch, field wiring from the 6275 Vent Sensor Assembly, and field wiring from the Submerged Motor Relays.

The **CB1** Relay, mounted in a socket, is connected to the power of the vacuum source and closes a contact that activates the **yellow Motor L.E.D.** Light on the 6280 System Monitor. It also tells the 6280 System Monitor that the proper vacuum has been achieved, within a prescribed time period, with a signal from the 93928 Differential Pressure Switch.

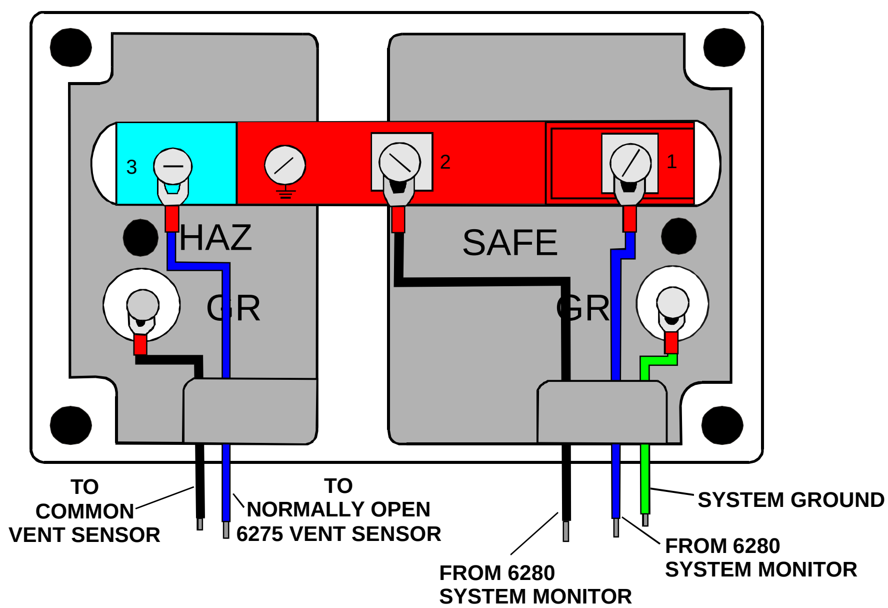
The **1005W** Solid State Relay senses the activation of product pump and transfers that signal to whichever vacuum source is being utilized at the site.

The System Monitor Control Box should be mounted near the Submerged Pump Control Relays and near a 110V standard electrical outlet for the 12VDC plug-in power supply. It should also be accessible to the electrical conduits from the 93928 Differential Pressure Switch and the 6275 Vent Sensor Assembly.

Executive Order G-70-186
Exhibit 2
Figure 4C

6299

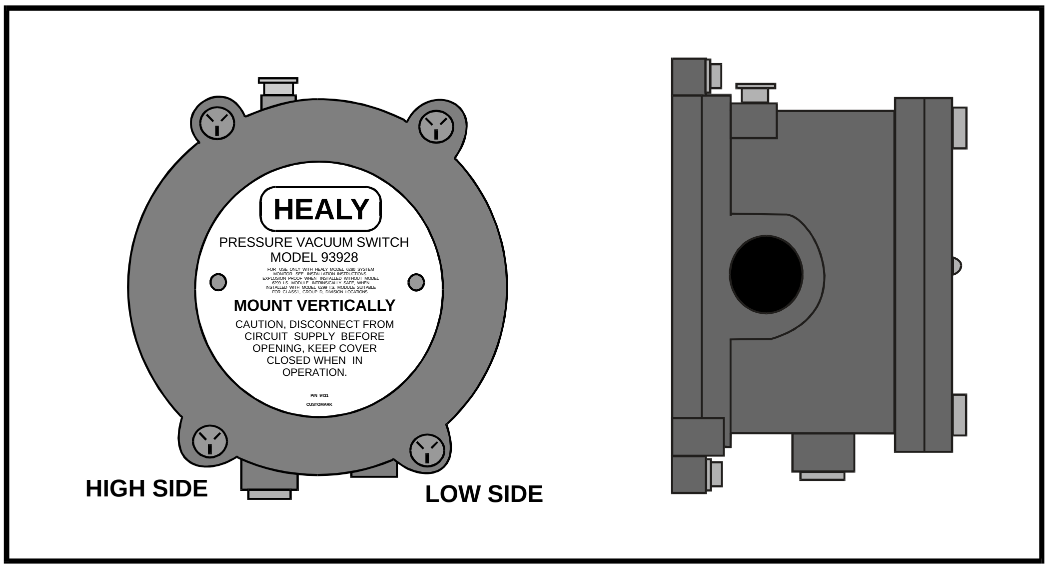
(INTRINSICALLY SAFE MODULE)



6299 Instrinsically Safe Module. (OPTIONAL) If used, is wired as follows: Mount the unit horizontally, near the pump relays and the **System Monitor Control Box (SMCB),** with the “HAZARD" and "SAFE" openings down. The conduit wiring (16 AWG, NEC Class 1, 600VAC) passes through two hazardous classified areas and must be sealed per the NEC on each end. Follow usual burial instructions per the NEC for getting the wires to the **6275 Vent Sensor.** Intrinsically safe wires require a dedicated, sealed conduit and cannot be run in the same conduit with any other type wire or voltage. The two signal wires from the control box **(SMCB)** which feed the IS module enter through the "SAFE" conduit opening and must be dressed to stay on that side of the built-in barrier. The GROUND wire also passes through this conduit. This ground wire has to be hard wired back to the service entrance ground. The conduit of these three wires does *not* need to be sealed. The two wires which go to the vent monitor leave the IS module through the "HAZARD" side conduit and must also be dressed to stay on their side of the barrier. This conduit *does have to sealed* in the usual manner for a "HAZARDOUS LOCATION".

Executive Order G-70-186
Exhibit 2
Figure 4D

93928
(VACUUM MONITOR PRESSURE SWITCH)

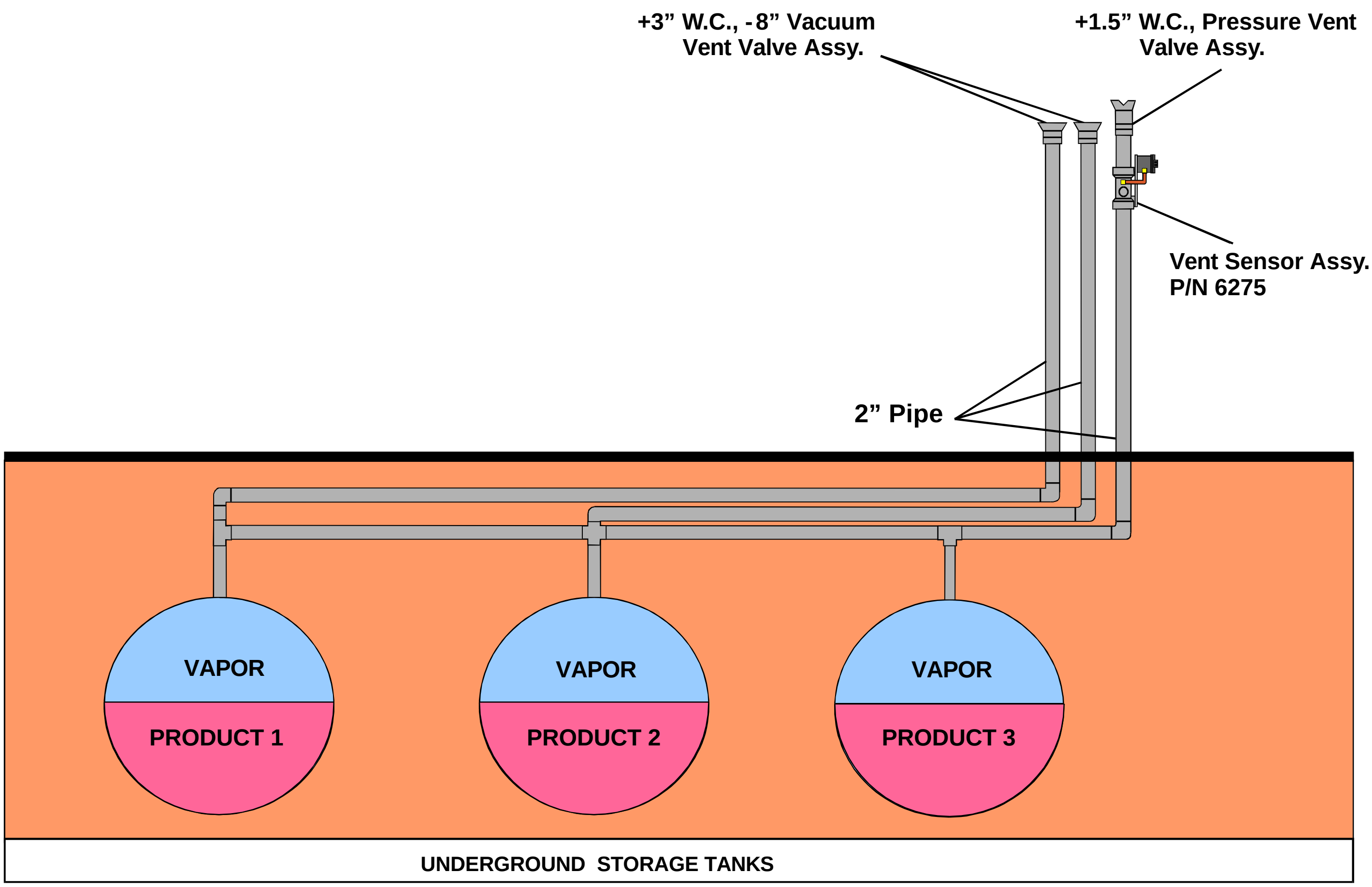


93928 Vacuum Monitor Pressure Switch. The 93928 Vacuum Switch is mounted on the Stage II Vapor Return line from the gasoline pumps, usually in a pit or sump on the underground tanks outside the building. At above ground installations, the switch is mounted near or on the vacuum source. Two wires (16 or 18 AWG) from the **SMCB** exit the building through a sealed conduit (per NEC). These wires must be 600 volt rated, Class 1 type insulation. They connect to the switch terminals common (COM.) and normally open (NO) inside the 93928 Vacuum Switch. See Healy Systems wiring diagram 9200-6308 (REV 4) sheets 1 and 2 for general layout and installation requirements.

Executive Order G-70-186
Exhibit 2
Figure 4E
Vent Piping Detail

Notes:

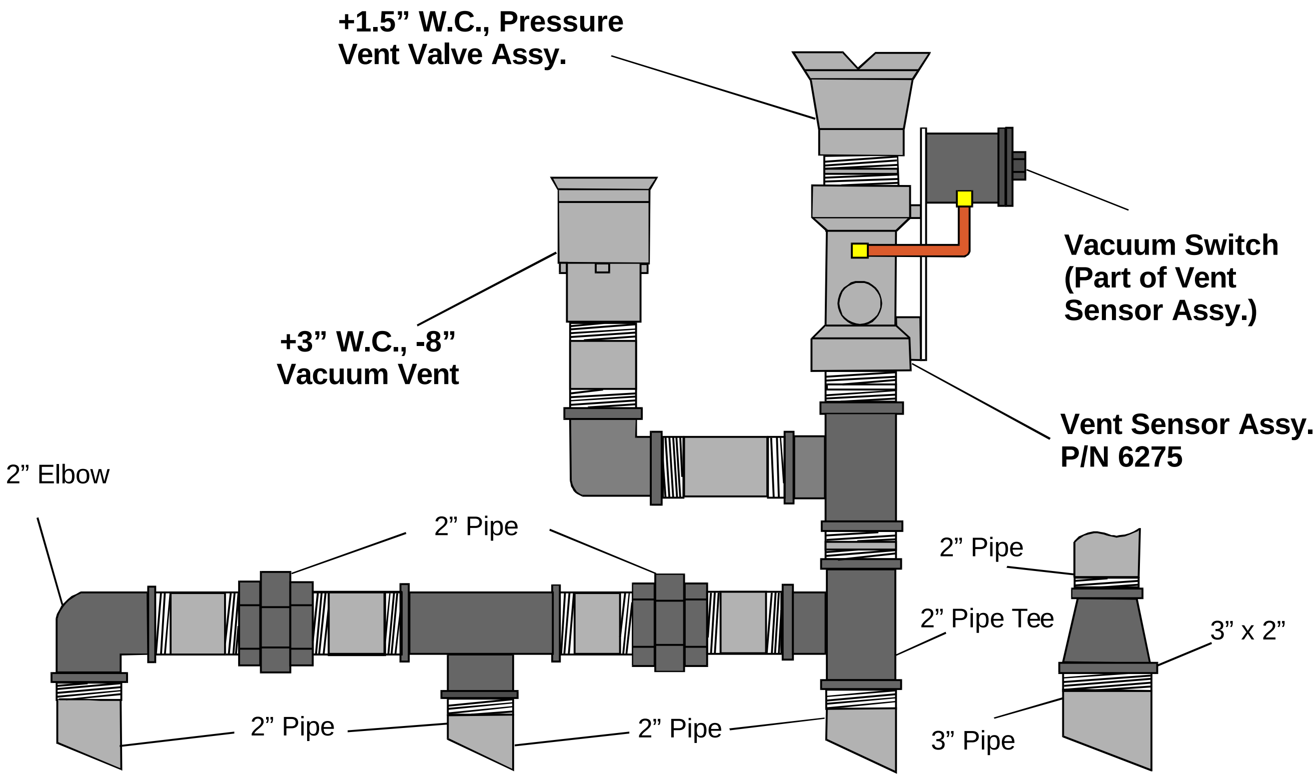
1. Installation shall be done in accordance with California Air Resources Board Regulations, Sub Chapter 11.5, and local APCD Rules.
2. All piping & fittings shall be installed in accordance with manufacturer's instructions and specifications.



Executive Order G-70-186
Exhibit 2
Figure 4F
Vent Manifold Assembly

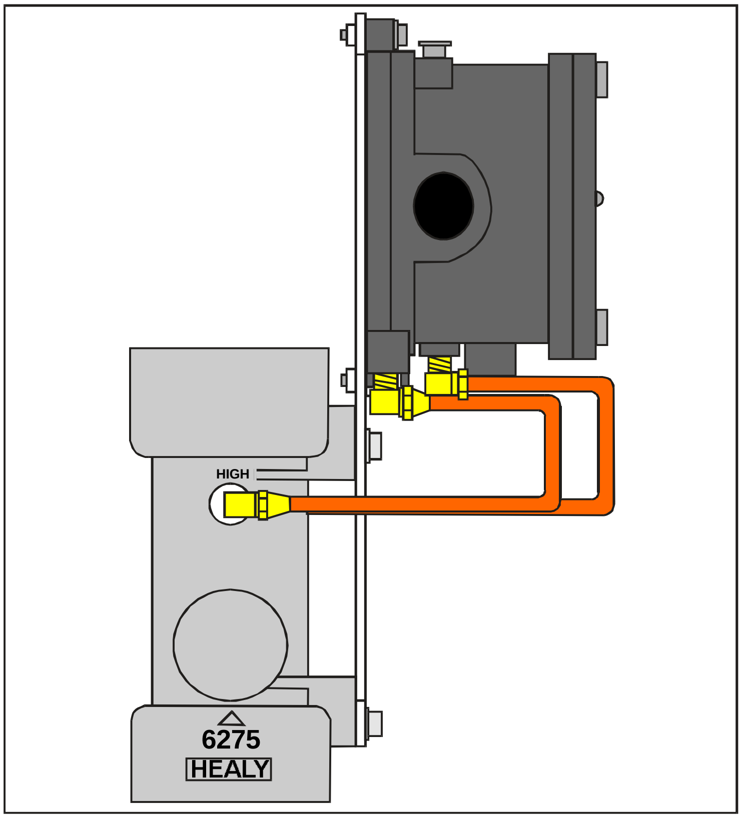
Notes:

1. Installation shall be done in accordance with California Air Resources Board Regulations, Sub Chapter 11.5, and local APCD Rules.
2. All piping & fittings shall be installed in accordance with manufacturer's instructions and specifications.



Executive Order G-70-186
Exhibit 2
Figure 4G

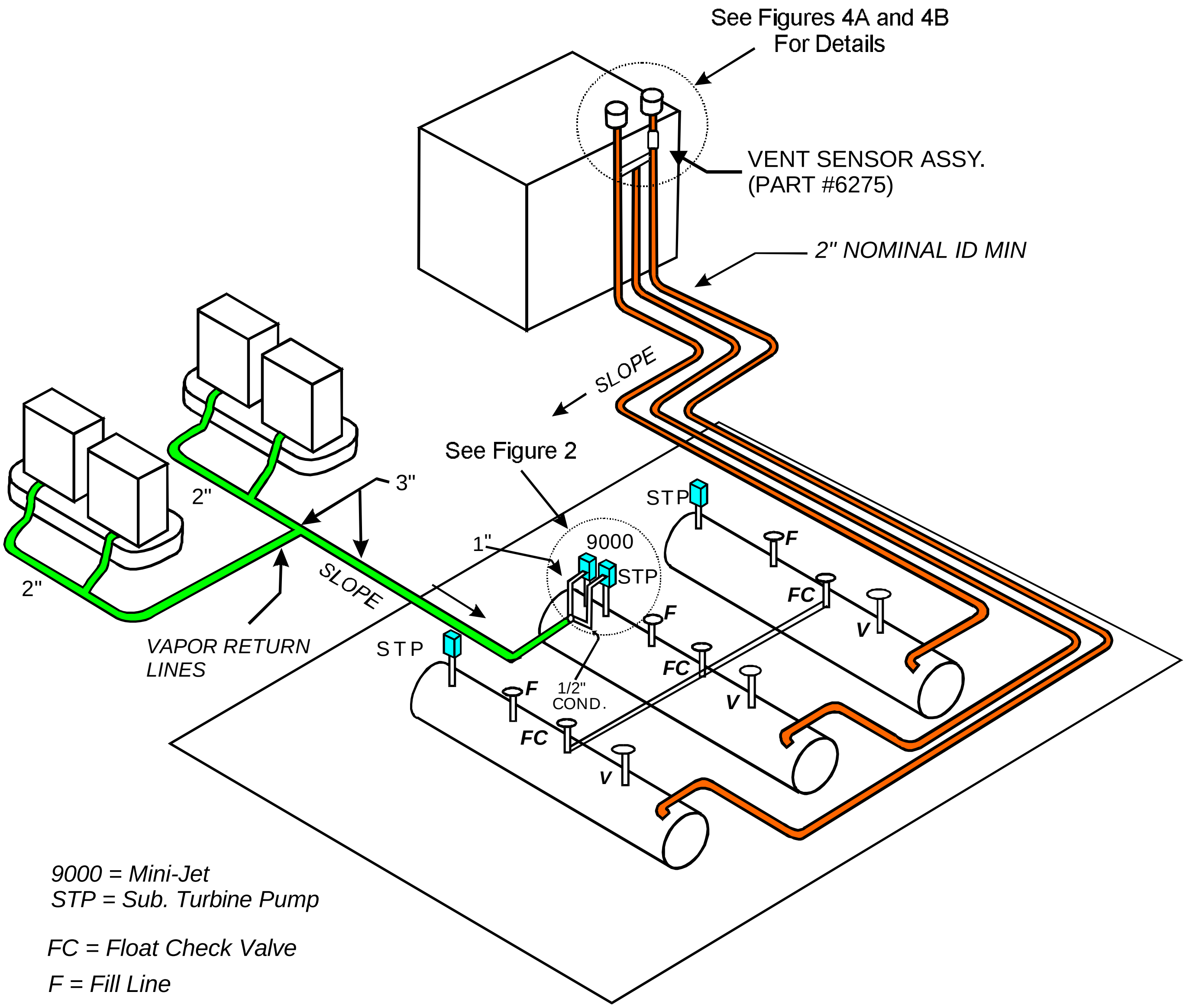
6275
(SYSTEM MONITOR VENT SENSOR)



6275 System Monitor Vent Sensor. The 6275 Vent Sensor is mounted on top of the manifolded vent pipes below the **+1.5" W.C. Pressure Vent Valve** usually outside the building (see Exhibit 2 Figure 4F). Two wires (16 or 18 AWG) from the **SMCB** exit the building through a sealed conduit (per NEC). These wires must be 600 volt rated, Class 1 type insulation. They connect to the switch terminals common (COM.) and normally open (NO) inside the **62755 Vent Sensor Switch** which is an integral part of the Vent Sensor Assembly. See Healy Systems wiring diagram 9200-6308 (REV 4) sheets 1 and 2 for general layout and installation requirements.

Executive Order G-70-186
Exhibit 2
Figure 5A

Typical Installation of the
Healy 400 ORVR Phase II Vapor Recovery System
Utilizing the Healy Model 9000 Mini-Jet Pump
With Two-Point Phase I System



9000 = Mini-Jet
STP = Sub. Turbine Pump

FC = Float Check Valve

F = Fill Line

V = Phase I Vapor Recovery

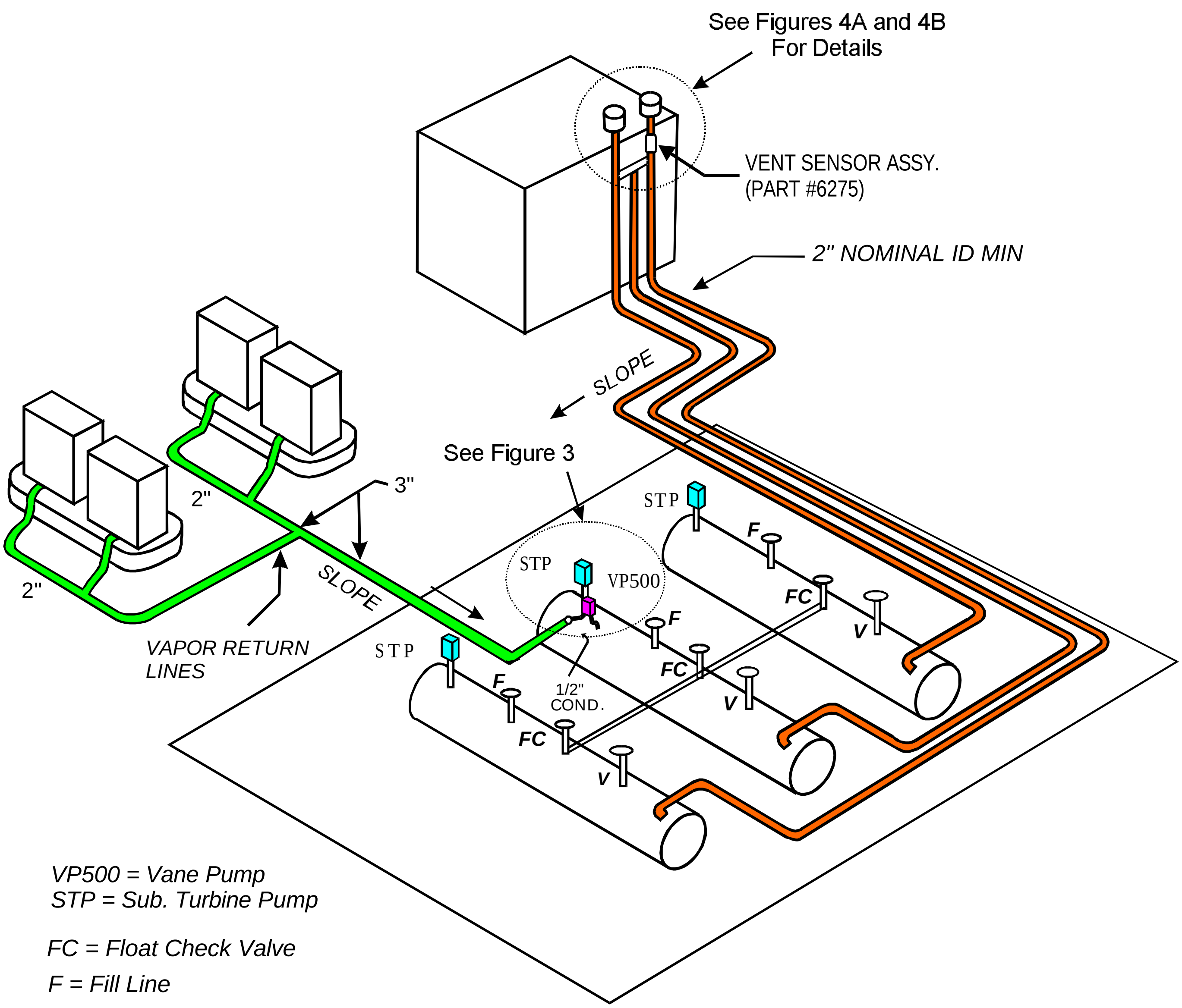
Note: 1. All Vapor/Vent Lines are 2" Nominal ID Minimum Except as Noted

2. Slope: 1/8" per foot Min.
1/4" per Foot Prefered

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

Executive Order G-70-186
Exhibit 2
Figure 5B

Typical Installation of the
Healy 400 ORVR Phase II Vapor Recovery System
Utilizing the VP-500 Vane Pump
With Two-Point Phase I System



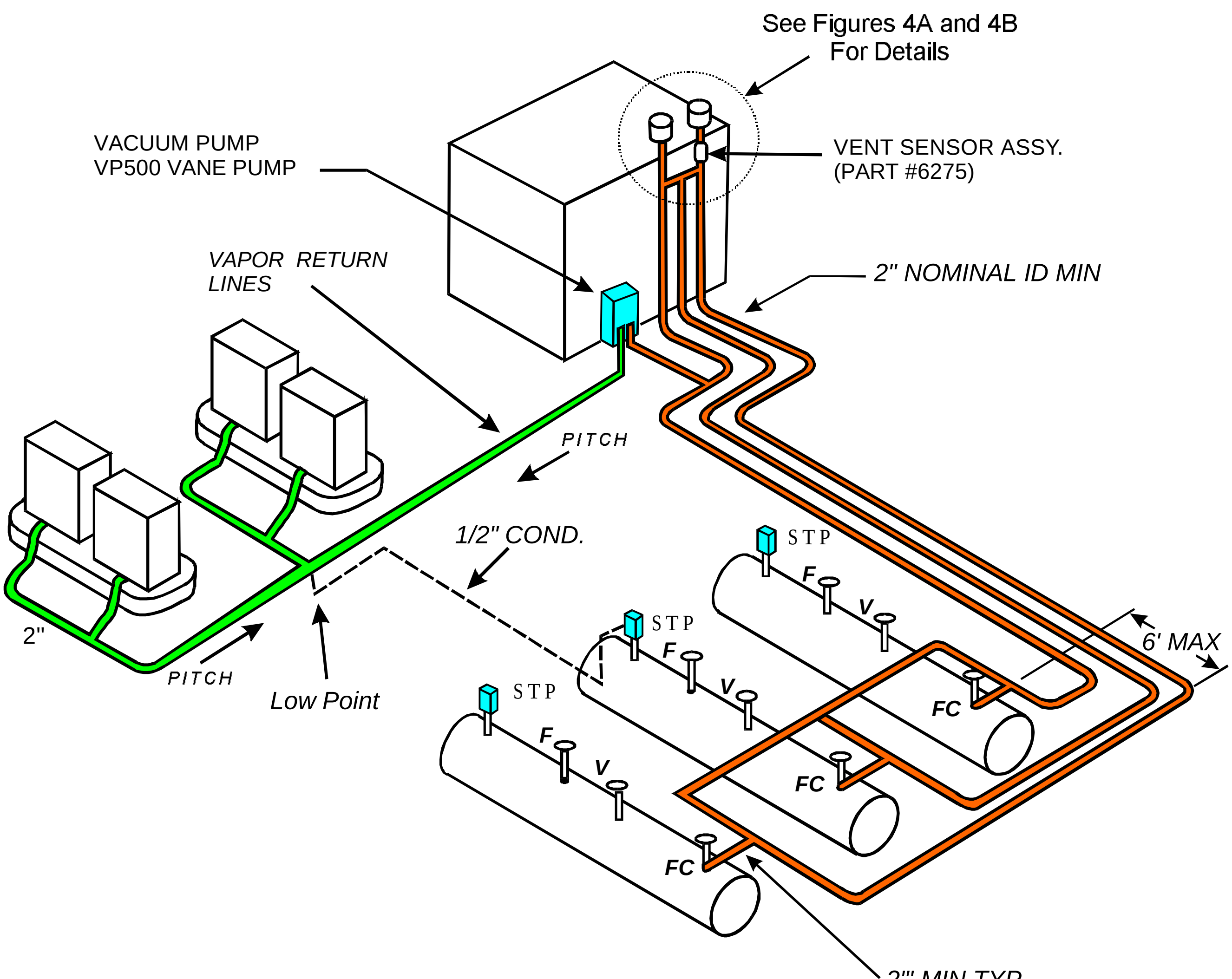
VP500 = Vane Pump
STP = Sub. Turbine Pump

FC = Float Check Valve
F = Fill Line
V = Phase I Vapor Recovery

Note: 1. All Vapor/Vent Lines are 2" Nominal ID Minimum Except as Noted
2. Slope: 1/8" per foot Min.
1/4" per Foot Prefered
3. Maintain 2'0" Clearance Between Fill Line and
Phase I Vapor Return Line to Delivery Truck

Executive Order G-70-186
Exhibit 2
Figure 5C

Typical Installation of the
Healy 400 ORVR Phase II Vapor Recovery System
Utilizing the VP-500 Vane Pump
With Two-Point Phase I System



STP = Sub. Turbine Pump
FC = Float Check Valve
F = Fill Line
V = Phase I Vapor Recovery

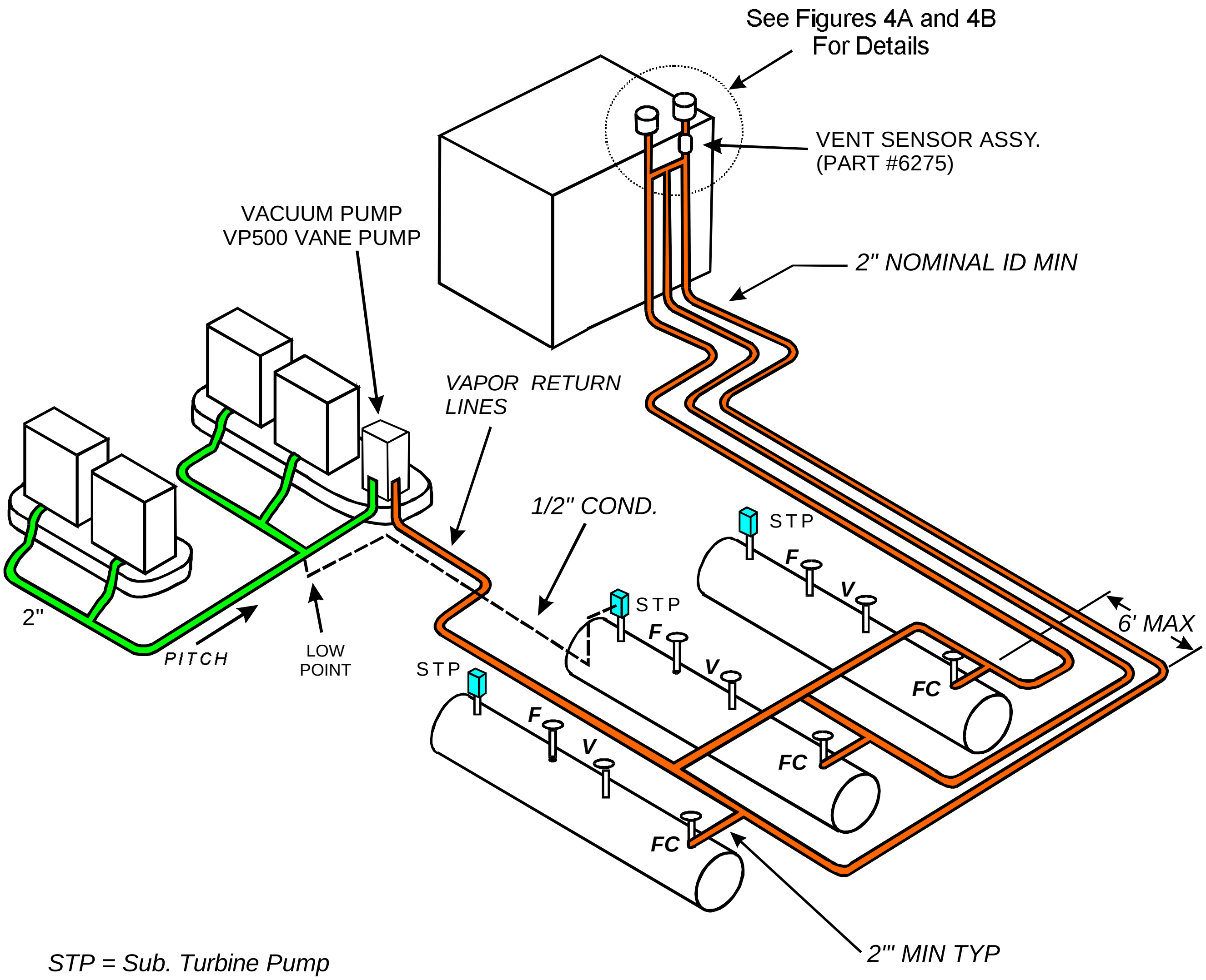
Note: 1. All Vapor/Vent Lines are 2" Nominal ID Minimum Except as Noted

2. Slope: 1/8" per foot Min.
1/4" per Foot Prefered

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

Executive Order G-70-186
Exhibit 2
Figure 5D

Typical Installation of the
Healy 400 ORVR Phase II Vapor Recovery System
Utilizing the VP-500 Vane Pump
With Two-Point Phase I System

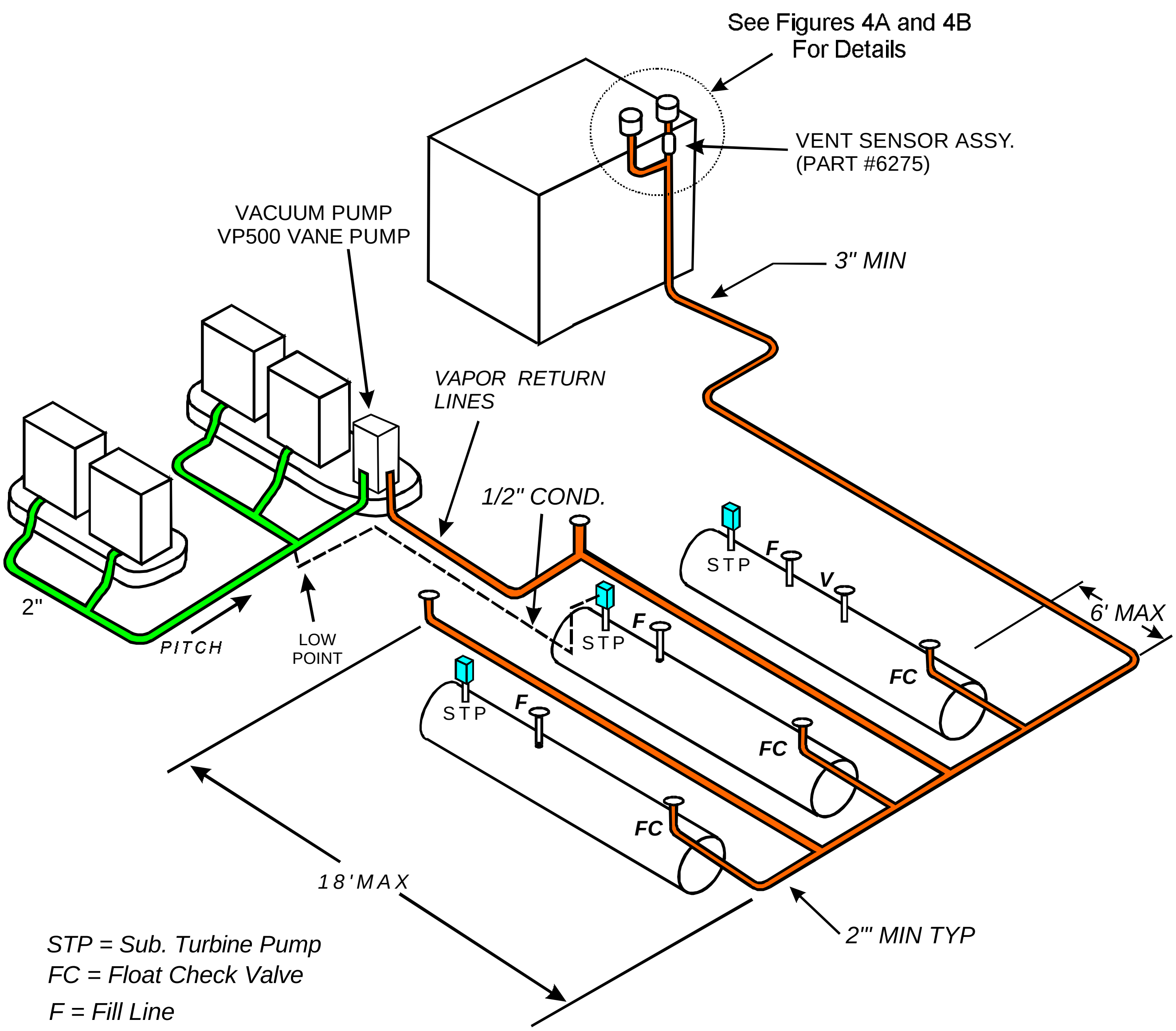


STP = Sub. Turbine Pump
FC = Float Check Valve
F = Fill Line
V = Phase I Vapor Recovery

Note: 1. All Vapor/Vent Lines are 2" Nominal ID Minimum Except as Noted
2. Slope: 1/8" per foot Min.
1/4" per Foot Prefered
3. Maintain 2'0" Clearance Between Fill Line and
Phase I Vapor Return Line to Delivery Truck

Executive Order G-70-186
Exhibit 2
Figure 5E

Typical Installation of the
Healy 400 ORVR Phase II Vapor Recovery System
Utilizing the VP-500 Vane Pump
With Two-Point Phase I System



STP = Sub. Turbine Pump

FC = Float Check Valve

F = Fill Line

V = Phase I Vapor Recovery

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

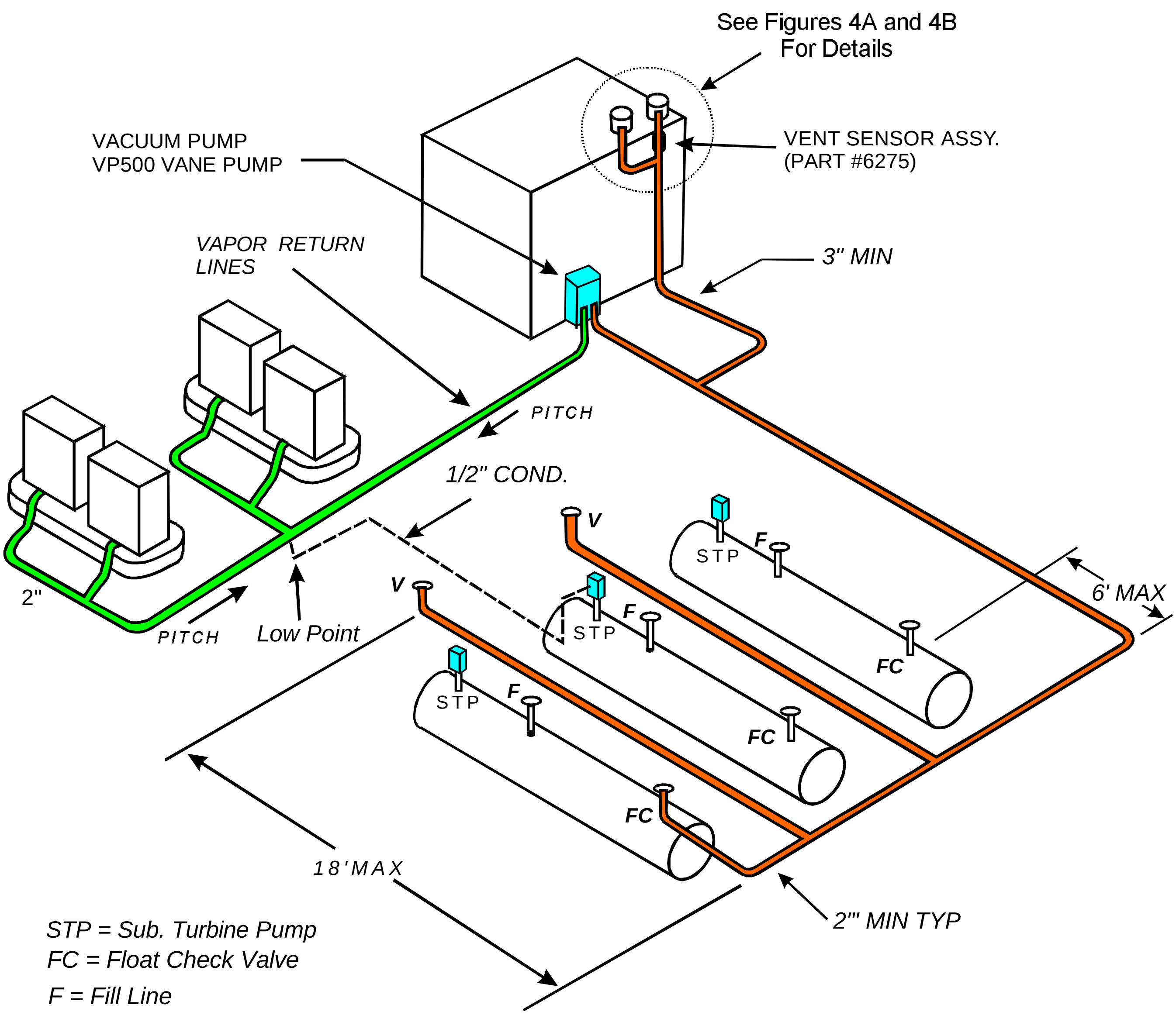
2. Slope: 1/8" per foot Min.
1/4" per Foot Prefered

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

4. No Less than one vapor return hose must be connected for each product being delivered

Executive Order G-70-186
Exhibit 2
Figure 5F

Typical Installation of the
Healy 400 ORVR Phase II Vapor Recovery System
Utilizing the VP-500 Vane Pump
With Two-Point Phase I System



STP = Sub. Turbine Pump
FC = Float Check Valve
F = Fill Line
V = Phase I Vapor Recovery

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

2. Slope: 1/8" per foot Min.
1/4" per Foot Prefered

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

4. No Less than one vapor return hose must be connected for each product being delivered

Executive Order G-70-186
Exhibit 2
Figure 6

MONITOR MAINTENANCE LOG SHEET

FACILITY

SUPERVISOR / CONTACT NAME

ADDRESS

(   )
FACILITY PHONE NUMBER

CITY   STATE   ZIP CODE

INSTALLATION DATE

Date & Time of Alarm	Type of Alarm	Date & Time Maintenance Called	Date Maintenance Performed	Maintenance Contractor: Phone: ( )
				Maintenance Performed
Date:	☐ Vacuum:	Date:	Date:	A. Test(s) Conducted:
Time:	☐ Vent:	Time:		B. Test Results: (Attach Additional Sheets If Needed)
Comments:				C. Component(s) Repaired or Replaced:

HEALY

Healy Systems, Inc.

17 Hampshire Drive, Hudson, NH 03051   Tel.: 1-603-882-2472 - Fax: 1-603-882-5189

Executive Order G-70-186

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 H_2O). 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 H_2O 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 H_2O. 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 H_2O column. Maximum incremental graduations of the pressure gauge shall be 0.05 inches H_2O 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 H_2O inclined manometer, or equivalent, may be used provided that the minor scale divisions do not exceed 0.02 inches H_2O.

3.2 If an electronic pressure measuring device is used, the full-scale range of the device shall not exceed 0-10 inches H_2O with a minimum accuracy of 0.5 percent of full-scale. A 0-20 inches H_2O 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.

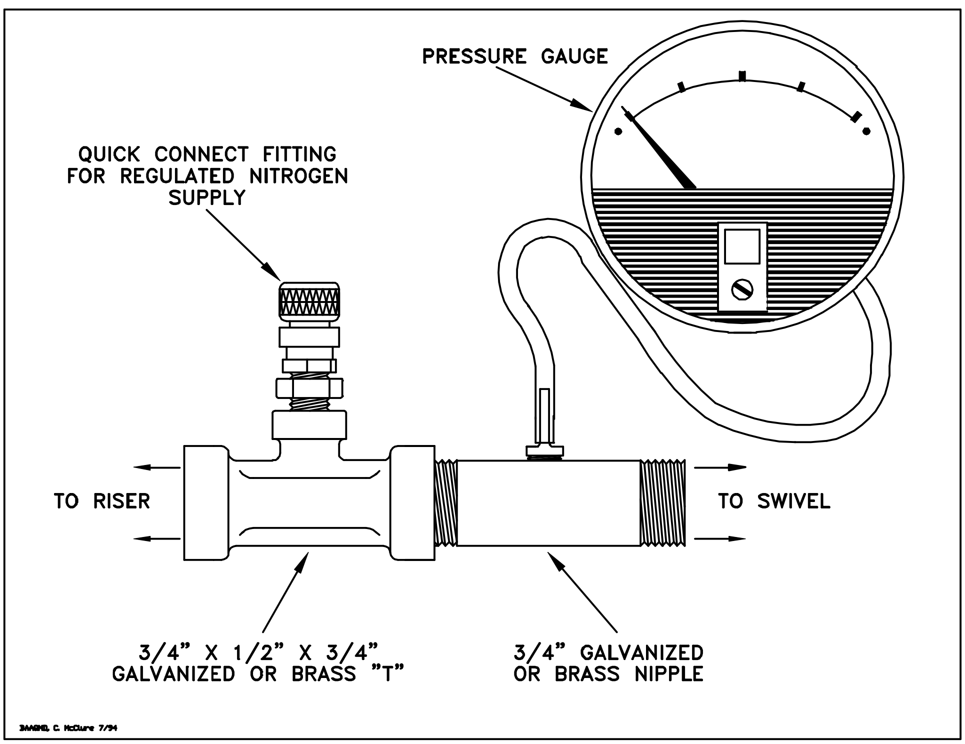
4. INTERFERENCES

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, liquefied 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-201.5 or equivalent) was conducted within the 24 hours prior to this test.

Figure 3-1

"T" Connector Assembly



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.

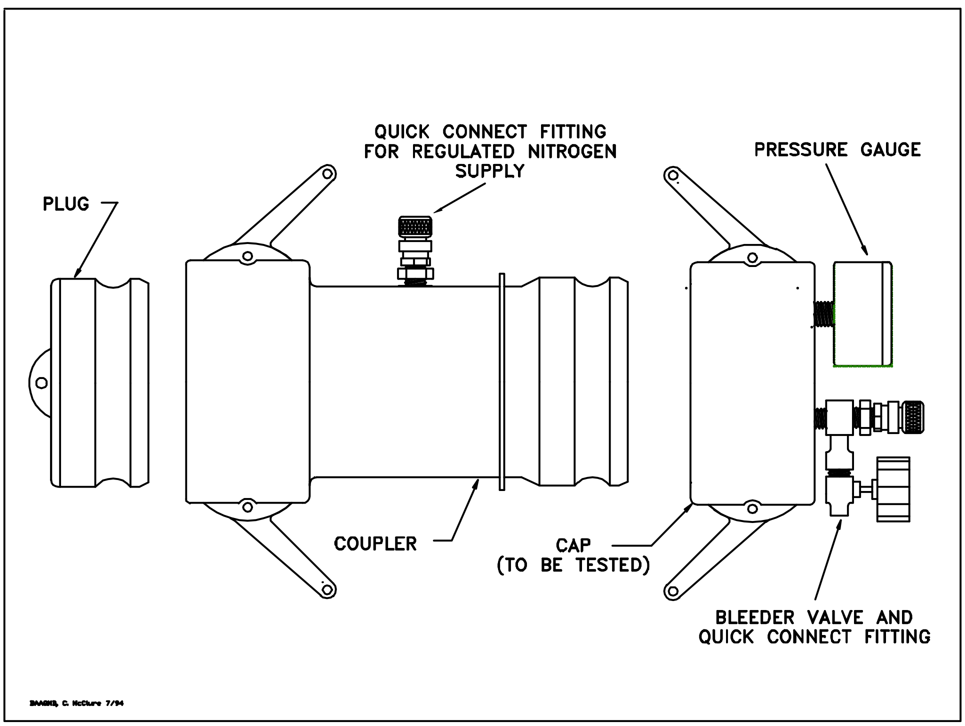
5.2 Pressure Measuring Device. Use 0-2.0, 0-1.0, and 0-0.50 inches H_2O pressure gauges connected in parallel, a 0-2 inches H_2O manometer, or an electronic pressure measuring device to monitor the pressure decay in the vapor recovery system. The pressure measuring device shall, at a minimum, be readable to the nearest 0.05 inches H_2O.

5.3 "T" Connector Assembly. See Figure 3-1 for example.

5.4 Vapor Coupler Integrity Assembly. Assemble OPW 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

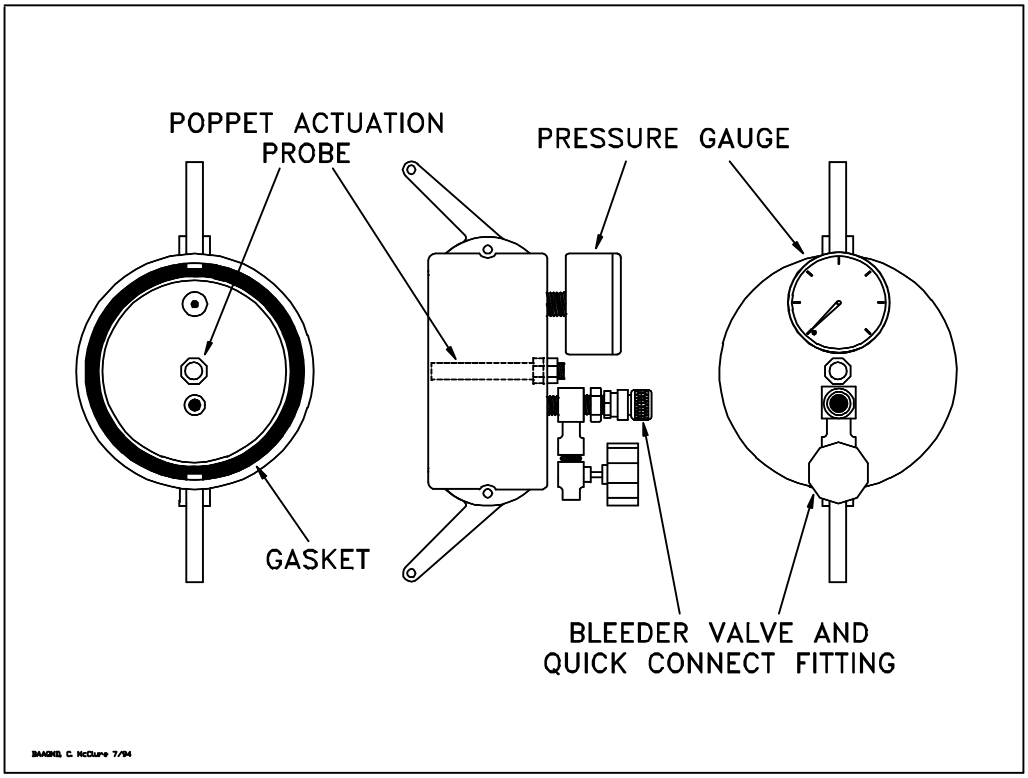
Vapor Coupler Integrity Assembly



5.5 Vapor Coupler Test Assembly. Use a compatible OPW 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.

Figure 3-3

Vapor Coupler Integrity Assembly



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.

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 H_2O, 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 H_2O.

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.

6.3 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 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, the valve assembly may be cleaned and lubricated prior to the test. This test shall, however, be conducted with the drain valve installed and the manhole cover removed. See subsection 7.4.1 for further details regarding containment box drain valves.

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 H_2O. 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 H_2O, 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 H_2O, 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 As an alternate to the requirements of subsections 6.7.1 through 6.7.3, leak detection solution may be used to verify the absence of vapor leaks through the Phase I vapor poppet on two-point Phase I systems. This alternative leak check is valid only for two-point Phase I systems in which tanks are manifolded. The manifold may be at the vent pipes. Pressurize the system to two (2) inches H_2O and use the leak detection solution to verify a zero leak (absence of bubbles) condition at one of the vapor poppets on the Phase I system.

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 which 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 H_2O. 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 H_2O, 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 H_2O 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 H_2O** 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.

7.1.1 If the time required to achieve the initial pressure of two (2.00) inches H_2O exceeds twice the time derived from Equation 9.2, stop the test and use a 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 H_2O.

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 Tables 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 9-2), re-pressurize 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, 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 Phase I system utilizes a non-CARB-certified drain valve equipped containment box, which was installed prior to July 1, 1992, for which a CARB-certified replacement drain valve assembly is not marketed, the following two subsections shall apply:

7.4.1.1 The drain valve may be removed and the port plugged. Reset the system. If the facility complies with the static leak test standards under these conditions, the facility shall be considered complying with the requirements, provided that the manufacturer and model number of the containment box and the date of installation are submitted with the test results.

7.4.1.2 The criteria set forth in subsection 7.4.1.1 shall not apply after July 1, 1996.

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-I, 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 H_2O, shall be calculated as follows:

[Equation 9-1]

$$P_f = 2e^{\frac{-500.887}{V}} \qquad \text{if N = 1-6}$$

$$P_f = 2e^{\frac{-531.614}{V}} \qquad \text{if N = 7-12}$$

$$P_f = 2e^{\frac{-562.455}{V}} \qquad \text{if N = 13-18}$$

$$P_f = 2e^{\frac{-593.412}{V}} \qquad \text{if N = 19-24}$$

$$P_f = 2e^{\frac{-624.483}{V}} \qquad \text{if N > 24}$$

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 H_2O
V = The total ullage affected by the test, gallons
e = A dimensionless constant approximately equal to 2.718
2 = The initial starting pressure, inches H_2O

9.2 The minimum time required to pressurize the system ullage from zero (0) to two (2.0) inches H_2O gauge pressure shall be calculated as follows:

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

Where:

t_2 = The minimum time to pressurize the ullage to two inches H_2O, 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:

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

Where:

P_{f-E} = The minimum allowable five-minute final pressure including allowable testing error, inches H_2O
E = The allowable testing error, percent
P_f = The minimum allowable five-minute final pressure calculated in Equations 9-1 or 9-2, inches H_2O
2 = The initial starting pressure, inches H_2O
408.9 = Atmospheric pressure plus the initial starting pressure, inches H_2O
406.9 = Atmospheric pressure, inches H_2O

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 H_2O
Minimum Pressure After 5 Minutes, inches of H_2O

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.

Form 3-1

Distribution:	**Executive Order G-70-186** **Exhibit 3** **Summary of Source Test Results**	**Report No.:** ________ **Test Date:** ________ **Test Times:** **Run A:** ________ **Run B:** ________ **Run C:** ________

Source Information		**Facility Parameters**
GDF Name and Address	**GDF Representative and Title** **GDF Phone No. ( )**	**PHASE I SYSTEM TYPE** (Check One) **Two Point** ☐ **Coaxial** ☐ **Coaxial with Spill Prevention**
	Source: GDF Vapor Recovery System	**PHASE II SYSTEM TYPE** ☐ Healy 400 ORVR
Permit Conditions	**GDF #** ________ **A/C #** ________	**Manifolded? Y or N**

Operating Parameters:

Number of Nozzles Served by Tank #1 ______ Number of Nozzles Served by Tank #3 ______

Number of Nozzles Served by Tank #2 ______ Total Number of Gas Nozzles at Facility ______

Applicable Regulations:	FOR OFFICE USE ONLY:

Source Test Results and Comments:

TANK #:	**1**	**2**	**3**	**TOTAL**
1. Product Grade				
2. Actual Tank Capacity, Gallons				
3. Gasoline Volume, Gallons				
4. Ullage, Gallons (#2 -#3)				
5. Phase I System Type				
6. Initial Test Pressure, Inches H_2O **(2.0)**				
7. Pressure After 1 Minute, Inches H_2O				
8. Pressure After 2 Minutes, Inches H_2O				
9. Pressure After 3 Minutes, Inches H_2O				
10. Pressure After 4 Minutes, Inches H_2O				
11. **Final Pressure After 5 Minutes, Inches H_2O**				
12. Allowable Final Pressure from Table 3-1				
13. Test Status [**Pass** or **Fail**]				

Test Conducted by:	Test Company Name ________ Address ________ City ________	Date and Time of Test:

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Exhibit 4

Vapor Return Line Vacuum Integrity Test for the Healy Model 400 ORVR System

1. Applicability

1.1 This test procedure is used to verify the vapor tightness of the portion of the Healy system which is subjected to relatively high levels of vacuum in the vapor return lines. A defective vapor valve, or any other defect which compromises the integrity of the vapor lines from the nozzle to the central vacuum unit, may cause the ingestion of large amounts of air. Excess air in the storage tanks will cause significant vent emissions when the pressure exceeds the pressure setting of the P/V valve. Ingested air will also cause the evaporation of gasoline in the storage tanks and may result in observable product shrinkage.

Note: This test is required in addition to, and not as an alternative for, the static pressure decay test in Exhibit 3.

2. Principle

2.1 The vapor lines from the nozzle to the central vacuum unit are isolated from the underground storage tanks by closing the vapor and siphon line ball valves after activating the central vacuum unit. The unit is turned off and the vacuum is allowed to decay. The value is compared with an allowable value.

3. Range

3.1 If mechanical pressure gauges are employed, the full-scale range of the pressure gauges shall be zero to 100 inches water column (0 - 100" wc), to be sensed as vacuum. Maximum incremental graduations of the pressure gauge shall be 2 inches wc and the minimum accuracy of the gauge shall be three percent of full scale. The minimum diameter of the pressure gauge face shall be four (4) inches.

3.2 If an electronic pressure measuring device is used, the full scale range of the device shall not exceed zero to 200 inches water column (0 - 200" wc) with a minimum accuracy of 0.5 percent of full scale.

4. Interferences

4.1 Any attempts to dispense product during the test will open the lines being tested and invalidate the results.

5. Apparatus

5.1 Pressure Measuring Device. Use a pressure gauge, or an electronic pressure measuring device, set up to measure vacuum, to monitor the decay of the vacuum level in the vapor return lines. The pressure measuring device shall, at a minimum, be readable to 2 inches water column.

5.2 Stopwatch. Use a stopwatch accurate to within 0.2 seconds.

6. Pre-Test Procedures

6.1 There shall be no product dispensing during the test.

6.2 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.

6.3 Remove the tap or quick-connect cap and install the pressure measuring device. The device shall be installed in the portion of the vapor line to be isolated.

7. Testing

7.1 Turn on the central vacuum unit (CVU) by activating a dispenser. The CVU is turned off by replacing the nozzle on the dispenser. Alternatively, the test may be conducted immediately following product dispensing.

7.2 Observe the vacuum level on the pressure measuring device. When the vacuum level is stable, or at the end of the dispensing operation, close the vapor and siphon line ball valves to isolate the vapor lines from the storage tanks (refer to Exhibit 2,Figures 2A thru 2D and Figure 3 for the location of the ball valves) and turn off the CVU by replacing the nozzle on the dispenser. If a stable vacuum level is not observed after one minute of CVU operation, or if the stable vacuum level is less than that indicated in Exhibit 2 as within the normal vacuum level for the CVU installed, turn off the CVU and check for problems before proceeding with the test.

7.3 Note the initial vacuum level and start the stopwatch. Record the vacuum level at one minute intervals. After five minutes, record the final vacuum level.

7.4 Calculate the difference between the final vacuum level and the initial vacuum level to obtain the observed change in vacuum. Note this value as the "measured DP". Estimate the total length of 2 inch diameter vapor return pipe from the dispensers to the CVU. Use this value to obtain the "calculated DP" in equation 4.1. If the "measured DP" is greater than the value obtained by equation 4-1**,** then a vapor leak is evident and the system has failed. If the vacuum level does not decay more than the allowable level, proceed to Section 8.

Equation 4.1 $$DP = 800/N$$

Where:

N = The approximate length of 2 inch vapor return pipe from the dispensers to the central vacuum unit to the nearest 20 feet .

DP = The observed change in vacuum level in inches of water column during a five minute observation period.

(**Note**: If the station contains 3 inch vapor return pipes, multiply the answer in Equation 4.1 by 0.5. This equation is based on an allowable leak rate of 0.08 gallons per minute.)

7.5 If the system has failed to meet the criteria set forth in Section 7.4, repair and replace defective components as necessary and repeat the test. Defective nozzles or other components may be diagnosed by bagging with bags containing air and observing collapse of the bags, or by otherwise isolating suspected components.

Note: This is only for diagnostic purposes; the test shall not be conducted with any bagged or isolated components.

7.6 If the system contains more than one CVU, repeat for each CVU and associated piping.

8. Post-Test Procedures

8.1 Remove the pressure measuring device and plug or cap to ensure that the connection point is leak tight.

8.2 Open the valves which were closed to isolate the vapor return lines.

9. Reporting

9.1 The observed initial, interim and final vacuum levels observed, the type of pressure measuring device (including range and accuracy and date of last calibration), the number of nozzles associated with the CVU and the measured DP shall be reported.

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Exhibit 5

Fillneck Vapor Pressure Regulation Fueling Test

1.0 Applicability

This test procedure is used to verify proper operation of the nozzle boot pressure regulation unique to the Healy Model 400 ORVR nozzle.

2.0 Principle

The nozzle vapor pressure regulation is verified during refueling into a tight simulated vehicle fuel tank with saturated vapors or into an actual vehicle.

3.0 Range

If a mechanical pressure gauge is employed, the full scale range of the pressure gauge shall be 1 inch pressure to 1 inch vacuum inches water column (-1.0 – 0.0 +1.0). Maximum incremental graduations of the pressure gauge shall be 0.5 inches WC, and the minimum accuracy of the gauge shall be three percent (3%) of full scale. The minimum diameter of the pressure gauge shall be four inches.

4.0 Interferences

4.1 No tears or holes are allowed in or on the nozzle boot or face seal.

4.2 The face seal must completely seal the test tank fillneck.

5.0 Apparatus

5.1 Measuring Device. Use a gauge mounted on a test tank to measure vapor regulation pressure during fueling. (See Exhibit 5, Figure 5.1)

6.0 Pre-Test Procedures.

6.1 Verify that the system vacuum source is operating in the 65” to 85” WC operating range.

6.2 Ensure that the high vacuum vapor return lines are tight. (See Exhibit 4).

6.3 All pressure measuring device(s) shall be bench calibrated using either a reference gauge or an incline manometer. Calibration shall be performed at 20, 50 and 80 percent of full scale. Accuracy shall be within two percent (2%) at each calibration point. Instrument Calibrations shall be conducted and verified a frequency not to exceed 90 days.

7.0 Testing

7.1 Position test tank next to dispenser nozzle being tested.

7.2 Dispense 1-2 gallons of gasoline into test tank.

7.3 Remove nozzle and replace fill cap.

7.4 Roll tank back and forth vigorously for thirty seconds to splash saturate the vapor head space in the tank.

7.5 Remove the fillpipe cap and insert nozzle, making a seal between the nozzle boot and the test tank fillpipe opening. Dispense gasoline (normally 3-5 gallons).

7.6 Observe pressure gauge during fueling. A properly operating system will show readings of between –0.25" and +0.25" WC during the fueling event. Failure of the nozzles to operate within the pressure regulation limits may be due to problems with the vacuum system or leaks in the vapor return lines, hoses or nozzles.

Note: The fillneck pressure may exceed +0.25" at the beginning of the test due to initial vapor growth within tank. This effect should subside within the first gallon of fuel dispensed.

7.7 Repeat test for additional nozzles. Drain test tank as necessary.

8.0 Reporting-

8.1 Record observed operating levels measured for each nozzle tested along with type and model of pressure measuring device used including: range, accuracy and date of last calibration.

Exhibit 5
Figure 1

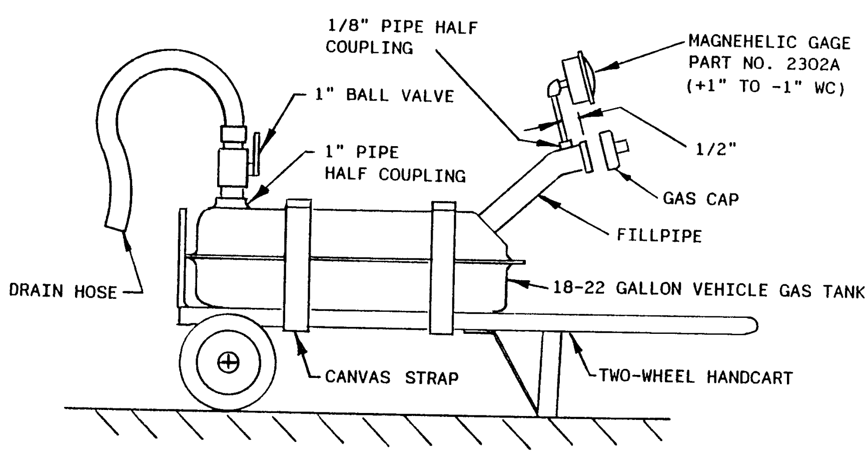

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EXHIBIT 6

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.