State of California
AIR RESOURCES BOARD

Executive Order G-70-150-AB

Modification to the Certification of the Gilbarco VaporVac 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 "Certification Procedures for Gasoline Vapor Recovery Systems at Service Stations" as last amended December 4, 1981 (the "Certification Procedures"), incorporated by reference in Title 17, California Code of Regulations section 94001;

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 "Test Procedures for Determining the Efficiency of Gasoline Vapor Recovery Systems at Service Stations" as last amended September 1, 1982 (the "Test Procedures"), incorporated by reference in Title 17, California Code of Regulations section 94000;

WHEREAS, Gilbarco Inc. ("Gilbarco"), requested and was granted certification of the VaporVac Phase II vapor recovery system ("VaporVac system") pursuant to the Certification Procedures and Test Procedures on March 26, 1993, by Executive Order G-70-150, and was granted a modifications to the certification by Executive Order G-70-150-AA, issued August 31, 1993;

WHEREAS, Gilbarco requested modification of the VaporVac system certification regarding manifolding at the vent lines in lieu of an underground manifold for existing installations, the storage tank pressure limitation, and interaction with the the Phase I system;

WHEREAS, Section VIII-A 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 Sections I through VII of the Certification Procedures; and

WHEREAS, I find that the VaporVac system conforms with all the requirements set forth in Sections I through VII of 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 conjunction with a Phase I vapor recovery system which has been certified by the Board.

NOW THEREFORE, IT IS HEREBY ORDERED that the certification, Executive Order G-70-150 AA, is hereby modified to allow manifolding at the vent lines in lieu of an underground manifold for existing installations, to remove the storage tank pressure limitation, and to clarify the interaction of the Phase I system with the Phase II system. The maximum dispensing rate for the VaporVac system shall be thirteen (13.0) gallons per minute. Exhibit 1 contains a list of the equipment certified for use with the VaporVac system. Exhibit 2 contains installation and performance specifications for the system.

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 is made a condition of this certification.

IT IS FURTHER ORDERED that the certified VaporVac 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 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/her designee.

IT IS FURTHER ORDERED that installations of the system certified hereby shall perform in actual use with the same effectiveness as the certification test systems. If, in the judgment of the Executive Officer, a significant fraction of installations fail 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. Any revision to the certification and/or test procedures relevant to this certification may be the basis for evaluation of the system and may constitute grounds for modification, suspension or revocation of this certification.

IT IS FURTHER ORDERED that all nozzles approved for use with the VaporVac system shall be 100 percent performance checked at the factory, including checks of proper functioning of all automatic shut-off mechanisms.

IT IS FURTHER ORDERED that the following requirements are made a condition of certification. The VaporVac system shall be installed only in facilities which are

capable of demonstrating on-going compliance with the vapor integrity requirements of the local air pollution control district ("district"). The owner or operator of the installation shall conduct, and pass, a static pressure decay test at least once in each twelve month period. The district may elect to impose more stringent test frequency requirements. The test shall be conducted in accordance with a CARB-approved or district-approved test procedure. (The most current draft procedure TP-201.3 may be used until a static pressure decay test procedure is adopted by the Board.) Alternative test procedures may be used if determined by the Executive Officer to yield comparable results and to not require components to possess greater integrity than was required for certification.

IT IS FURTHER ORDERED that, at such time as the contribution of the fugitive emissions which may result from pressurization of the storage tanks can be quantified, if such emissions are found to affect the overall effectiveness of the system, the efficiency of the system may be reevaluated and revised.

IT IS FURTHER ORDERED that the certified VaporVac 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. The station manager, owner or operator shall also be provided with instructions on the proper use of the VaporVac system, its repair and maintenance, and where system replacement and system components can be readily obtained. Copies of the manufacturer's warranty for the VaporVac system shall be made available to the station manager, owner or operator.

Executed at Sacramento, California, this 17th day of February, 1994.

James D. Boyd
Executive Officer

Attachments

Executive Order G-70-150-AB

Exhibit 1

VaporVac System Equipment List

Component	Manufacturer/Model	State Fire Marshal Identification Number
Nozzle	OPW 11-VAI-42 (leaded) -47 (unleaded) -22 (leaded, Hold Open Latch) -27 (unleaded, Hold Open Latch) OR Any inverted coaxial nozzle CARB-certified for use with the VaporVac system.	005:008:050
Inverted Coaxial Hose	Thermoid Hi-Vac Goodyear Flexsteel Dayco 7282 Superflex 2000 OR Any inverted coaxial hose CARB-certified for use with the VaporVac system.	005:037:003 005:036:002 005:033:005
Pressure/Vacuum Valve	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 $\pm$ 0.5") water column. Vacuum: eight plus or minus two inches (8 $\pm$ 2") water column. Note: For systems installed before two CARB-certified valves which meet the above criteria are available, or within thirty days after that date, a valve with the following settings may be used for a period not to exceed four years from the date the second valve was certified: Pressure: at least one and not exceeding three and one-half inches (1 - 3.5") water column. Vacuum: at least one-half ounce/inch^2(0.87" wc). Local districts may require valves with higher settings and/or may require earlier replacement of the 1" pressure/vacuum valves.	

Breakaway Couplings	Catlow AV200, AV200-1	005:030:005
	Richards Industries VA-50, VA-51	005:031:007
	OPW 66CI	005:030:005
	OR	
	Any inverted coaxial breakaway CARB-certified for use with the VaporVac system.	
Dispensers	Advantage Series B"XY" ("X" may be 0 through 9 or A, "Y" may be 0 through 9, A through P)	
VaporVac Retrofit Assemblies (For the Advantage Series and MPD-1, 2/C, and 3)	CV00"XY"-"ZZ" ("X" may be 0 through 3 "Y" may be 0 through 9 "Z" may be 0 through 9 and designates cosmetic features such as color)	

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Exhibit 2

Specifications for the VaporVac Bootless Nozzle System

Figure 2-A contains a drawing of a typical installation of the VaporVac system. Figures 2-B and 2-C depict the operation and location of component parts of the VaporVac system.

Nozzles

1. Leaded and unleaded spouts are interchangeable.

2. Failure mode testing demonstrated that blockage of some of the vapor collection holes in the spout has negligible effect on the operation of the system until only four or fewer holes remain unblocked. Any OPW 11-VAI nozzle which is found to have less than four unobstructed vapor collection holes is defective and shall be immediately removed from service.

Inverted Coaxial Hoses

1. The maximum length of the hose shall be fifteen (15) 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.

Breakaway Couplings

1. Breakaway couplings are optional but, if installed, only certified breakaways may be used.

VaporVac System

1. The normal operating range of the system, as measured by air-to-liquid ratio testing, is 1.10 to 1.15 plus or minus 0.10 (1.00 to 1.25). Failure mode testing has demonstrated that potential malfunctions which do not shut down the fueling point result in an air-to-liquid ratio less than 0.9. Therefore, the air-to-liquid ratio of the system shall be not less than 0.9, measured at a flowrate of at least eight gallons per minute (8 gpm). Any fueling point not capable of demonstrating compliance with this performance standard shall be deemed defective and removed from service. For the purpose of determining non-compliance, the results of at least three air-to-liquid ratio tests shall be

averaged. The air to liquid ratio shall be determined by a CARB-approved or district-approved test procedure. (Draft procedure TP-201.5 may be used until an air to liquid ratio test procedure is adopted by the Board.) Alternative test procedures may be used if they are determined by the Executive Officer to yield comparable results.

Note: this test procedure returns air rather than vapor to the storage tank, and normally causes an increase in storage tank pressure and may cause vent emissions. This is a temporary condition due to the test is should not be considered an indication of malfunction or noncompliance.

2. The VaporVac shall be equipped with electronic safeguards designed to ensure that no fuel is dispensed unless the VaporVac system is operating properly. An error code is indicated which identifies the problem as being related to VaporVac.

   The following conditions shall halt or inhibit the operation of the one side of the dispenser, with an error code indicated, while allowing the other side to operate.

   - Excessive vapor pump motor current (possible causes include bearing failure, locked rotor, motor winding shorts or fluid in pump cavity for more time than required to clear a blockage).

   - Failure of the vapor pump to start while fuel is being dispensed (possible causes include control electronics failure, disconnected or severed motor wiring, or locked rotor).

   - Vapor pump activity during idle periods when no fuel is being dispensed.

   - Maximum permissible pump speed exceeded (possible causes include loose connections in vapor path or pump malfunction).

   - Disconnection or accidental swapping of Side A/B vapor pumps.

The following conditions shall shut down the entire dispenser in a manner similar to a "dead-man switch", in that VaporVac must actively prevent its activation. This is achieved by requiring the VaporVac to maintain a normally-closed switch, which will open should the VaporVac be taken "off line" via various mechanisms.

- Failure or loss of VaporVac power supply.
- A.C. line fuse opens.
- Cabling/wiring missing or disconnected (tampering).

3. The mass emission rate measured during the efficiency test: 0.277 pounds per 1,000 gallons.

Vapor Lines and Tank Vents

1. The pressure drop through the system, measured at a flow rate of 60 SCFH, should be as low as possible. The maximum recommended pressure drop from the dispenser riser to the storage tank is 0.02 inches water column (0.03 inches water column if the measurement includes an impact valve). The maximum allowable pressure drop through the system shall not exceed one/half inch (0.5") water column measured at a flow rate of 60 SCFH with dry Nitrogen. The pressure drop shall be measured from the dispenser riser to the storage tank with the poppeted Phase I vapor connection open and with pressure/vacuum valves installed or with the vents capped.

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. The internal diameter of the connector, including all fittings, shall be not less than five-eights inch (5/8").

3. The recommended nominal inside diameter of the underground Phase II plumbing is as indicated in Figure 2-A. Smaller vapor lines are not recommended but may be used provided the pressure drop criteria specified above is met. The vapor return lines shall be manifolded as shown in Figure 2-A.

   Exception: For installations with a vapor return line directly to only one tank, and for which a manifold on the tank vents will be used to provide part of the vapor return path to other tanks, the vent manifold may be used as an alternative to the underground manifold only in existing installations where the vapor piping is already installed, and shall not be used in "new" installations where vapor piping is being installed. For installations with

dedicated vapor piping directly to each tank, the vent manifold is approved for both new and existing installations and an additional tank manifold below grade is optional but not required.

4. 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.

5. A pressure/vacuum (P/V) valve shall be installed on each tank vent. Vent lines may be manifolded 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 CARB-certified as specified in Exhibit 1. The outlets shall vent upward and be located to eliminate the possibility of vapors accumulating or traveling to a source of ignition or entering adjacent buildings.

6. All vapor return and vent piping shall be installed in accordance with the manufacturer's instructions and all applicable regulations.

Storage Tank and Phase I System

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

1. A threaded tap shall be installed at which the storage tank pressure may be monitored. The tap may be in the dispenser riser connection or on the vent line, and shall be accessible for connection to a pressure gauge. One tap is adequate for manifolded systems. The tap shall remain plugged and vapor tight except when test equipment is being connected to or removed from it. If located on the vent line, the tap shall be at least six feet (6') and not more than eight feet (8') above grade.

   Note: Frequent venting, except when caused by air ingested into the system during the performance of the air-to-liquid ratio test or Phase I activities, may indicate system malfunction. Observation of rapid pressure decay when no vehicles are fueling may indicate leaks in the system; a static pressure decay test may be used to determine compliance with the vapor integrity requirements.

2. The Phase I vapor and fill caps provide an additional seal which may prevent vapor emissions when they are in place. However, the caps must be removed during Phase I operations and may result in loss of vapor from the storage tank. Therefore, compliance with static pressure decay test criteria

shall be demonstrated with these caps removed. Prior to pressurizing the system, verify that the liquid level in the storage tanks is at least eight inches (8") above the highest opening at the bottom of the submerged drop tube.

3. 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 demonstrate compliance with static pressure decay test criteria both with the cover open and with the cover closed.

4 Coaxial Phase I vapor recovery systems and manholes with cover-actuated drain valves certified prior to the effective date of this Order shall not be used with the VaporVac Phase II system; only CARB-certified two-point Phase I systems shall be installed. Where the VaporVac installation is made by retrofitting previously installed equipment, local districts may elect to allow the 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;
- installation of the Phase II system requires no modification of the storage tanks and/or connections; and
- the existing coaxial Phase I equipment is in good working order and has demonstrated compliance with the static pressure decay test criteria when tested with all fill caps removed.

5. 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. 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 vapor valve is opened only after all vapor connections have been made, and is closed before disconnection of any vapor hoses. The vapor hose is disconnected from the storage tank before it is disconnected from the delivery tank.

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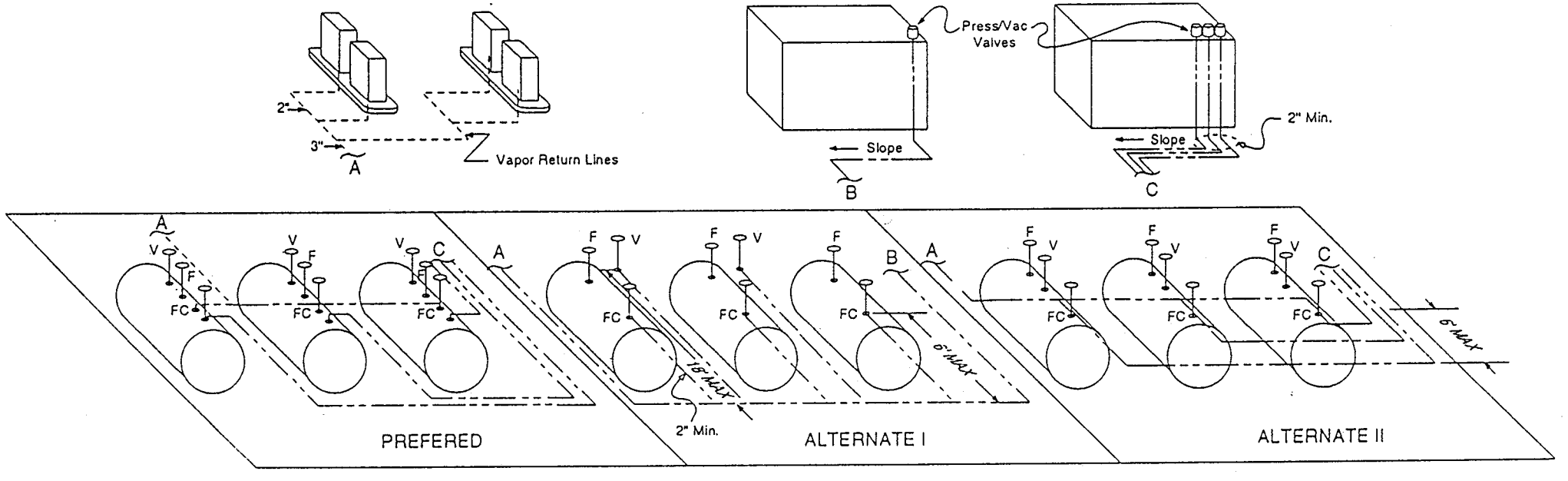
Figure 2-A
Typical Installation of the
Gilbarco VaporVac Phase II Vapor Recovery System
With Two-Point Phase I System



FC = Float Check Valve
F = Fill Line
V = Stage 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" Clearrance Between Fill Line
And Stage I Vapor Return Line To Truck

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Figure 2-A (continued)
Typical Installation of the
Gilbarco VaporVac Phase II Vapor Recovery System
With Two-Point Phase I System

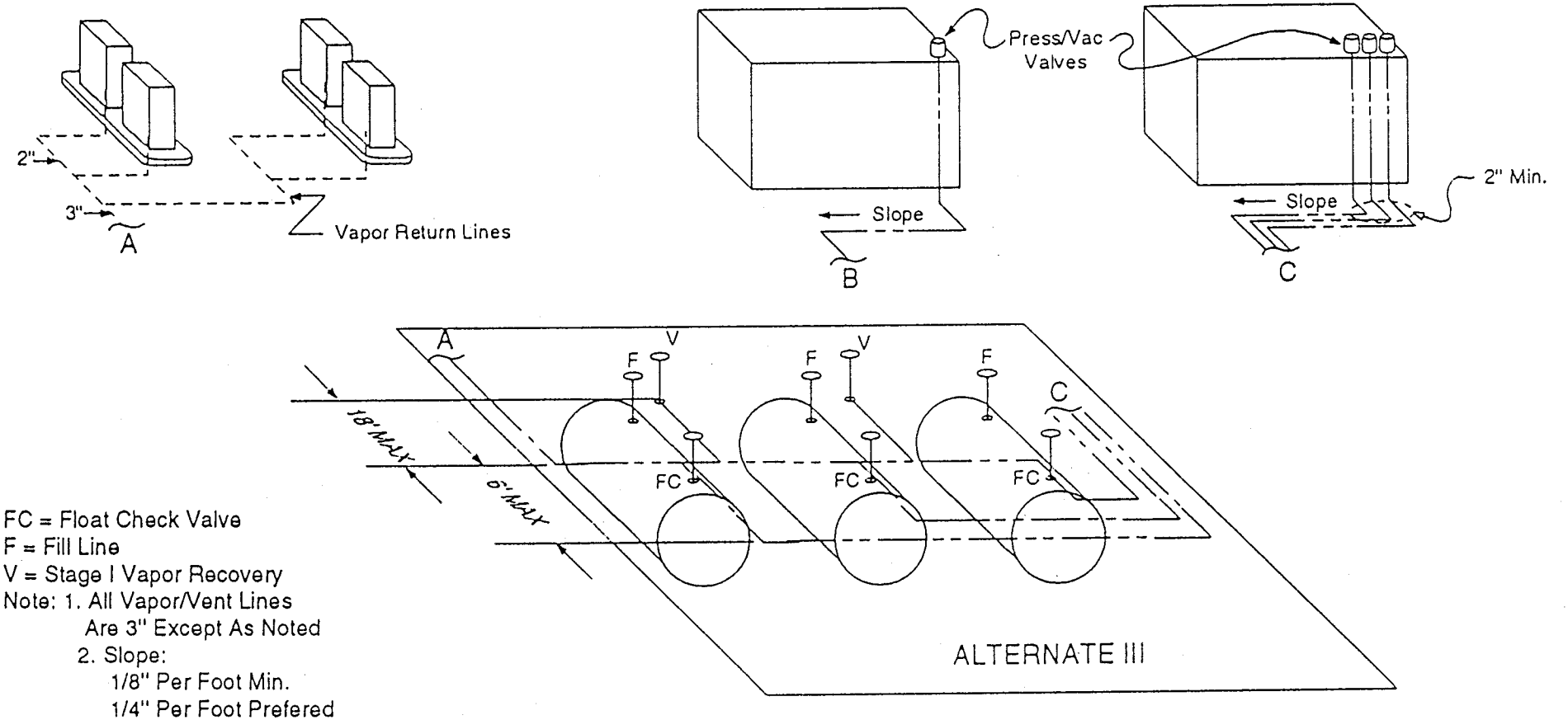

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Figure 2-B
Gilbarco VaporVac System

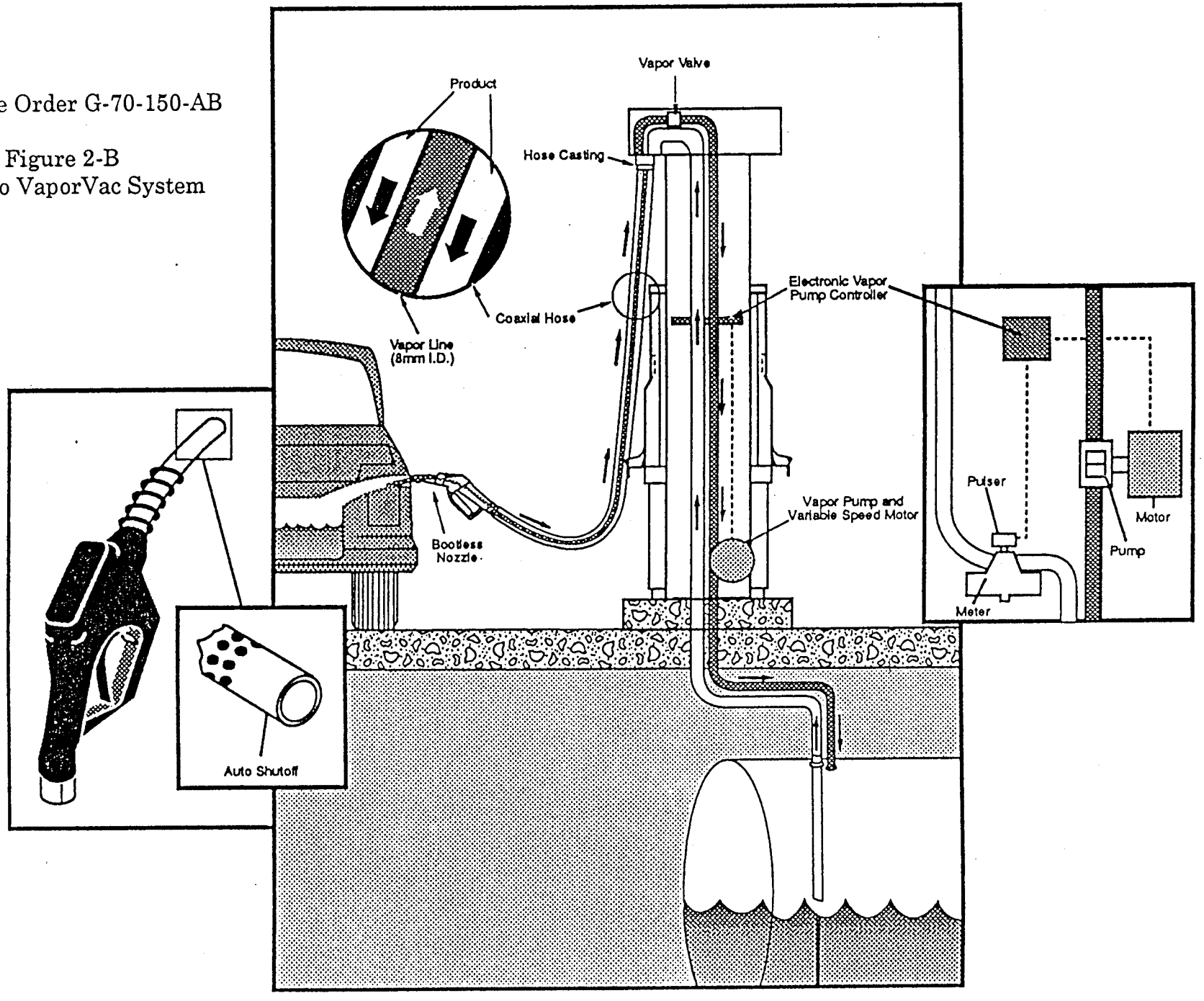
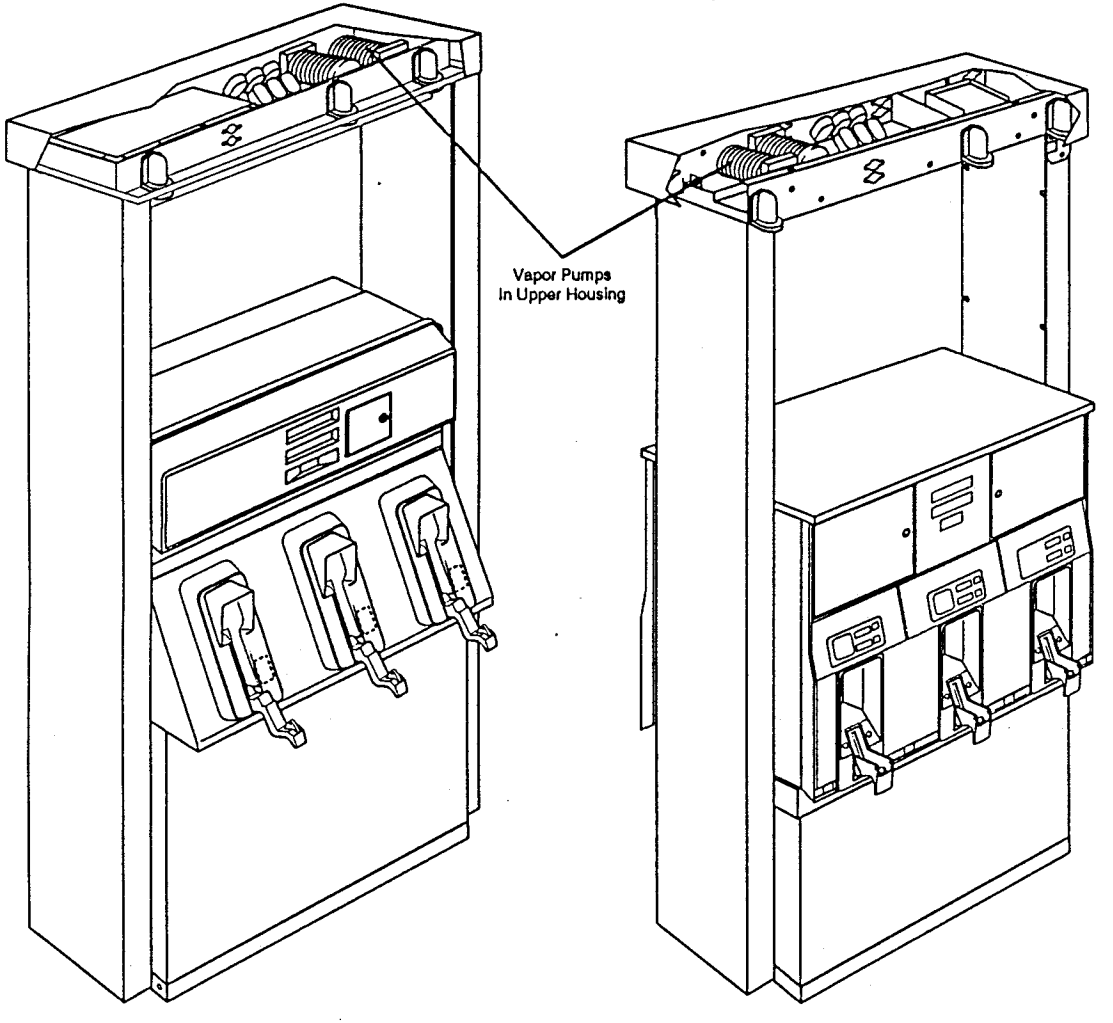


Figure 2-C

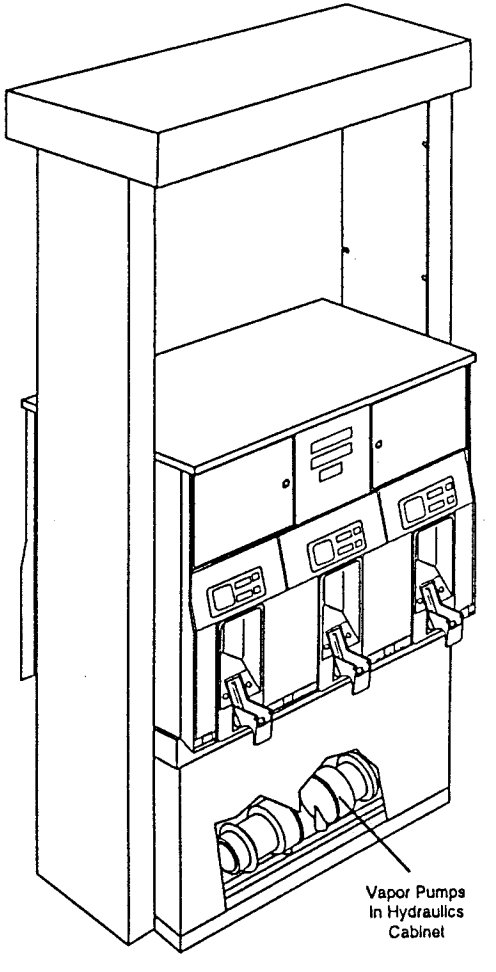
VaporVac™ Vaccum Assist Vapor Recovery Systems

Component Locations



MPD® 1-2/C and 3 Dispenser Retrofits

The Advantage™ MPD Dispenser Retrofits



The Advantage™ MPD Dispenser Production Models

Gilbarco