

Owner/Operator's Guide to Operation and Maintenance of Vapor Recovery Systems at Gasoline Dispensing Facilities

API RECOMMENDED PRACTICE 1639
FIRST EDITION, JULY 2003

REAFFIRMED, MAY 2012



AMERICAN PETROLEUM INSTITUTE

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Downstream Segment

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FOREWORD

This recommended practice provides guidance for owners and operators of gasoline dispensing facilities and regulatory officials regarding the operation and maintenance of gasoline vapor recovery systems and components. Proper operation and maintenance of vapor recovery equipment can improve compliance with vapor recovery regulations and provide substantial emission reductions.

In preparing this recommended practice, careful consideration was given to the following:

- a. Promoting safety.
- b. Protecting human health and the environment.
- c. Preventing release of vapors from service stations.
- d. Detecting petroleum vapor releases.
- e. Minimizing the cost of effective maintenance.

Every effort has been made to ensure the consistency of the recommendations with the applicable sections of NFPA 30 *Flammable Liquid Code* and NFPA 30A *Code for Motor Fuel Dispensing Facilities and Repair Garages*. In addition, consideration was given to local, state and federal laws and regulations.

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Suggested revisions are invited and should be submitted to the standardization manager, American Petroleum Institute, 1220 L Street, N.W., Washington, D.C. 20005.

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Owner/Operator's Guide to Operation and Maintenance of Vapor Recovery Systems at Gasoline Dispensing Facilities

1 Purpose and Scope

This Recommended Practice (RP) is designed to provide guidance to owners and operators of gasoline dispensing facilities (GDF) to effectively operate and maintain Stage I and Stage II vapor recovery systems. This guide does not address the maintenance required by qualified service technicians to perform periodic testing and major system repairs. Federal and/or State regulatory agency certified or approved vapor recovery systems/equipment must be used to maintain the efficiency of the vapor recovery system. The appropriate state and/or locality should be contacted individually for site-specific requirements.

This RP recommends the need for periodic inspections of Stage I and Stage II equipment. The equipment and the criteria for inspection are identified in highlighted text with a corresponding letter that indicates the frequency of the inspection. That is, a **(D)** represents a recommendation for a daily inspection; **(W)** recommends a weekly inspection; **(M)** recommends a monthly inspection; and **(A)** recommends an annual inspection. Appendix A is a suggested inspection checklist for the equipment and criteria identified in the text.

2 References

API
RP 1007 *Loading and Unloading of MC 306/DOT 406 Cargo Tank Motor Vehicles*

NFPA¹
30 *Flammable Liquid Code*

30A *Code for Motor Fuel Dispensing Facilities and Repair Garages*

3 Definitions and Acronyms

Appendix B lists definitions and acronyms that may be helpful in understanding vapor recovery systems.

4 Vapor Recovery Requirements

4.1 VAPOR RECOVERY SYSTEMS

4.1.1 Stage I vapor recovery involves the return of vapors stored in the underground storage tank (UST) back to the tank truck during product delivery. Vapors in the underground tank headspace, i.e., the area in the tank above the liquid level, are displaced by the gasoline entering the tank during delivery. Headspace is also known as ullage. A flexible hose, provided by the transport company, connects the storage tanks providing a path for the vapors to return to the truck. Vapors in the truck are then returned to the distribution terminal for processing.

Stage I vapor recovery is required by state and local regulations in most of the United States. Stage II vapor recovery is required in certain air quality nonattainment areas by federal regulations, and is administered by the states. Stage II regulations include some requirements for Stage I equipment.

¹National Fire Protection Association, 1 Batterymarch Park, Quincy, Massachusetts 02269.

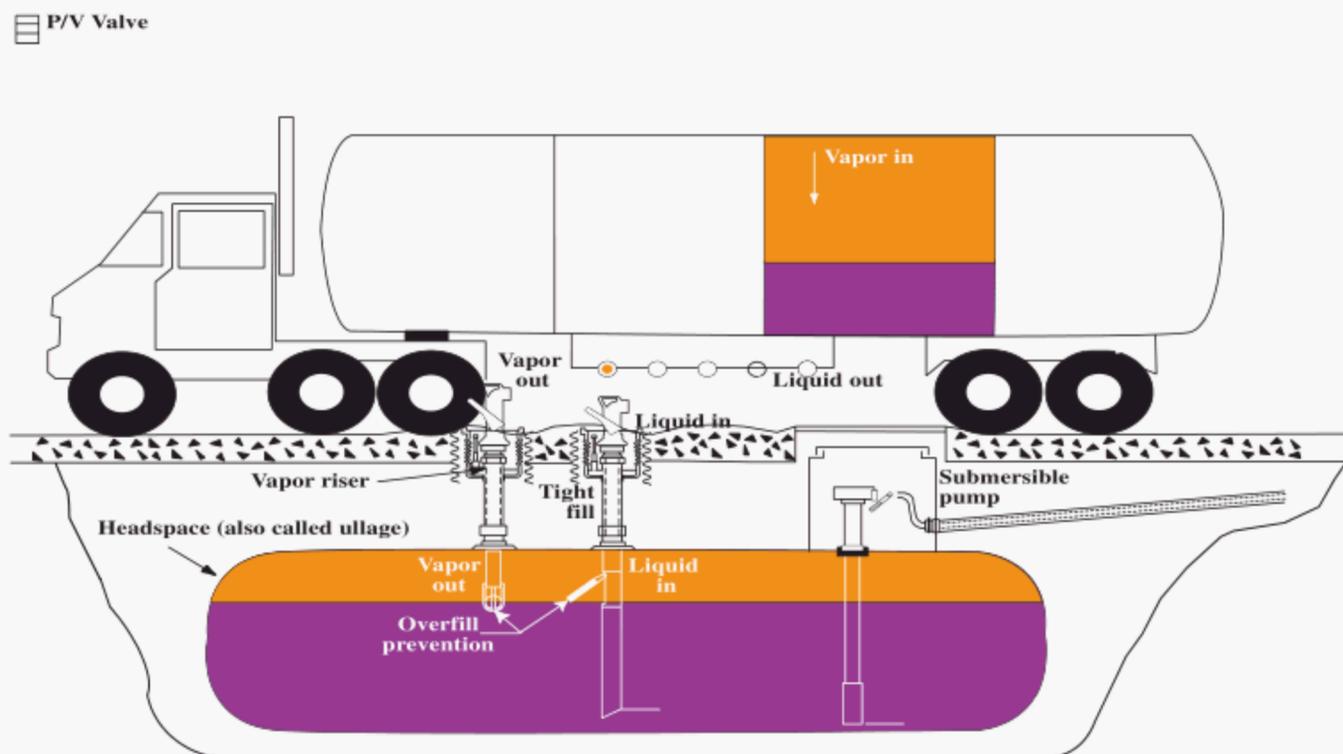


Figure 1—Stage I Vapor Recovery Two-Point (Dual) System

There are two types of Stage I systems: a two-point (dual) system, which uses separate product and vapor connections on the underground tank; and a coaxial system, which uses a single connection fitting to the underground tank.

4.1.1.1 Two-point (Dual) System

The delivery of product and recovery of vapors in a Stage I two-point system occurs through separate connections (see Figure 1). The product is delivered (dropped) by gravity through a full connection and the vapors are returned through a separate vapor connection. The fill connection is fastened to a submerged fill tube that must have its discharge opening entirely submerged when the liquid level is 12 inches above the bottom of the storage tank. (Local requirements may require the installation to be no higher than 6 inches.) The vapors are recovered through the second opening in the top of the storage tank and transferred to the tank truck through the vapor hose.

4.1.1.2 Coaxial System

The delivery of product and recovery of vapors in a Stage I coaxial system occur through a single coaxial submerged fill

tube, which is simply a tube inside a tube (see Figure 2). The product is delivered through the inner tube and the vapors are recovered through the annular space between the walls of the inner and outer tubes. As with the dual system, the inner product tube must be entirely submerged when the liquid level in the tank is 12 inches or more while the outer vapor tube is in the top of the tank. (Local requirements may allow the installation to be no higher than 6 inches.)

The coaxial submerged fill tube may be either fixed in position or spring-loaded (moveable) with a vapor seal similar to the dry break adapter seal in the dual system. Unlike the fixed version, the spring-loaded version has a flange around the edge of the inner tube. A gasket is seated on the top surface of the flange. In this position, the gasket makes contact with the inner surface of the adapter at the top of the submerged fill tube, thereby holding the entire assembly in place and creating a vapor seal.

All current California Air Resources Board (CARB) Executive Orders certifying vacuum assist vapor recovery systems prohibit the use of coaxial Stage I systems for stations constructed after 1993. Many states refer to CARB Executive Orders for approved systems and components.

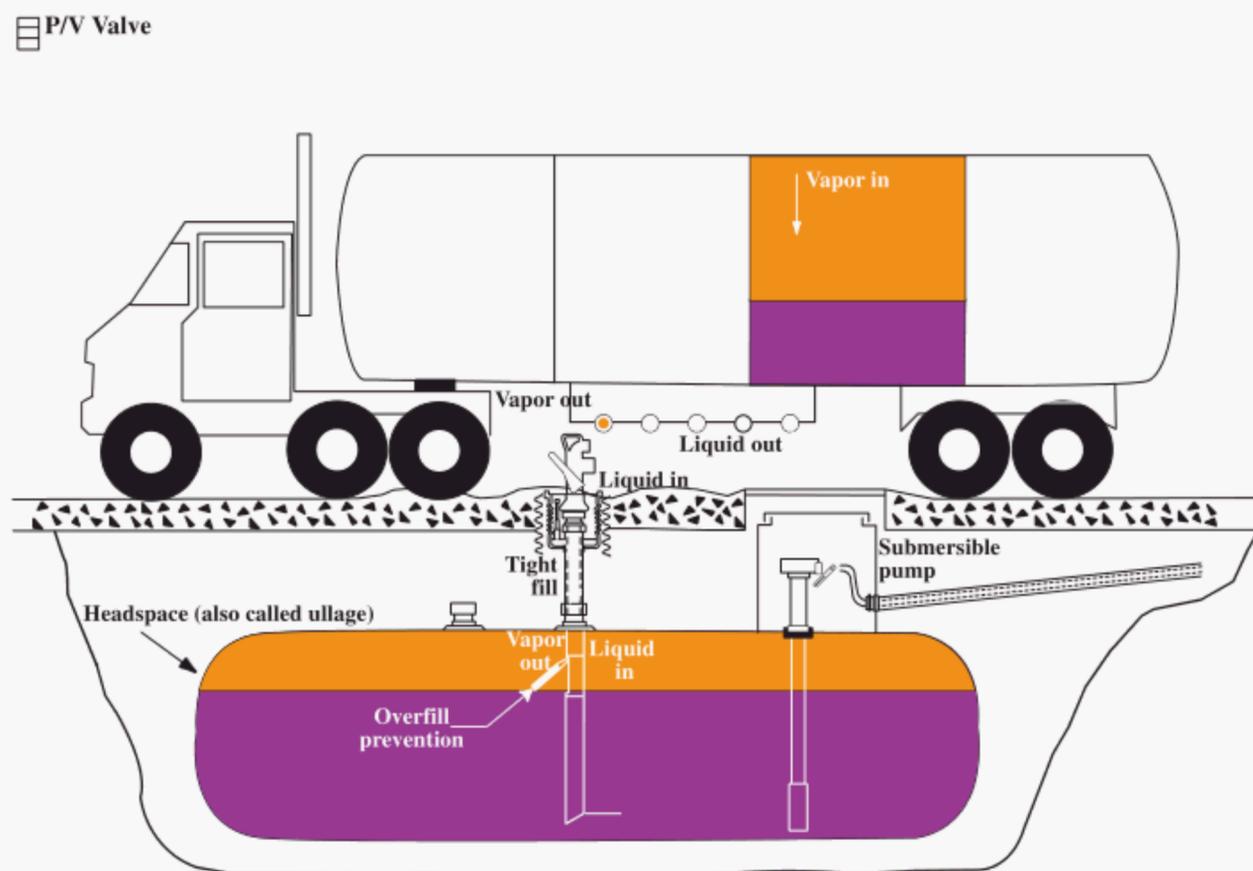


Figure 2—Stage I Vapor Recovery Coaxial (Dual) System

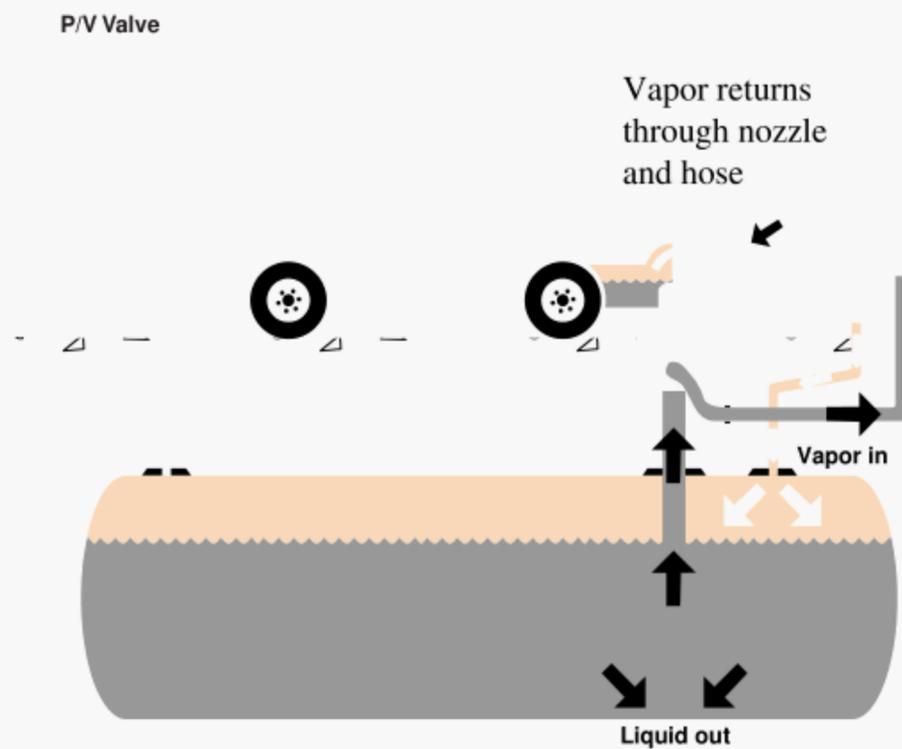


Figure 3—Stage II Vapor Recovery System

4.1.2 Stage II Vapor Recovery

Stage II vapor recovery systems capture the vapors generated during vehicle refueling. The vapors recovered from the vehicle tank are returned to the UST. Vapor recovery systems include all piping, nozzles, dispenser components, and other equipment necessary for the control of gasoline vapors during vehicle refueling (see Figure 3).

There are two types of Stage II vapor recovery systems: balance systems, which use nozzles that make a tight fit with the vehicle fillneck during refueling, and vacuum assist systems, which use nozzles that make a loose fit with the vehicle fillneck and use vacuum to recover displaced vapors. Nozzles are certified to work on specific vapor recovery systems and must meet minimum efficiency standards.

4.1.2.1 Balance System

The balance type vapor recovery system operates on the principle of positive displacement during gasoline transfer operations. The system is designed to collect gasoline vapors displaced from the vehicle fuel tank during refueling and return them to UST. To contain vapors during refueling, a closed loop must be created between the vehicle fuel tank and the UST. The vapors are collected at the vehicle-fill pipe interface by a combination fuel-dispensing, vapor-collection nozzle. Typically, the nozzle contains a no-seal/no-flow feature consisting of an interlock which prevents dispensing of gasoline unless the nozzle boot is compressed. This feature ensures the best possible seal between the nozzle boot and the fill pipe interface. Vapors are pushed through vapor passages in the nozzle and the coaxial vapor hose into the dispenser

vapor piping, that is connected to the UST. Some coaxial vapor recovery hoses contain an aspirator, or venturi, to remove condensed vapors or product pushed into the hose during topping off. Some gasoline dispensing facilities still use the older twin-hose systems.

4.1.2.2 Vacuum Assist System

The vacuum assist system develops suction with a vapor pump driven by an electric motor or with a dual-chamber, gasoline liquid-driven pump. The vapors are drawn through a nozzle and an “inverted” coaxial hose, through the vacuum pump and piping, and into the underground tank.

Some vacuum assist systems use on-site vapor processors to control the emission of excess vapors. The two types of processors are the incinerator and the membrane system. The incinerator burns vented hydrocarbon vapors (HC) and transforms them into carbon dioxide and water—products of combustion. A membrane system separates excess HCs from air and returns the HCs to the UST headspace.

Most vacuum assist systems use the smaller inverted vapor recovery hose. This hose has a traditional hard rubber outer wall for liquids. Vapors flow through a small tube inside of the gasoline hose.

5 Equipment Inspections

5.1 GENERAL

5.1.1 The purpose of regular inspections of vapor recovery equipment is to look for visible signs of damage or deterioration that might prevent the vapor recovery system from func-

tioning properly and to correct problems when they are discovered. Inspections of vapor recovery equipment should be documented when performed. Inspectors should familiarize themselves with the particular vapor recovery system being inspected. They should familiarize themselves with the operation of all components and should recognize when the components are not in good operating condition.

5.1.2 Follow manufacturers' recommendations for inspections and maintenance of equipment.

5.1.3 All GDF supervisory personnel should familiarize themselves with inspection procedures and the follow-up actions if they discover problems requiring correction.

5.1.4 Personnel performing equipment inspections should have proper training to conduct effective inspections and all such training should be documented.

5.2 STAGE I EQUIPMENT

Stage I vapor recovery equipment is designed to prevent the release of vapors from tank vents and other tank fittings during deliveries. Equipment which fails inspection requirements should be repaired or replaced as soon as possible and in accordance with local requirements. Some equipment components may have to be taken out of service until repaired or replaced. A qualified service technician should complete maintenance and repairs that cannot be made by the operator.

5.2.1 Tank Fill Caps

5.2.1.1 Tank fill caps are designed to tightly seal tank fill adaptors at all times except during deliveries.

- W 5.2.1.2** Inspect tank fill caps for cracks and damaged gaskets. Replace damaged, worn or missing caps and gaskets. (See Figure 4.)

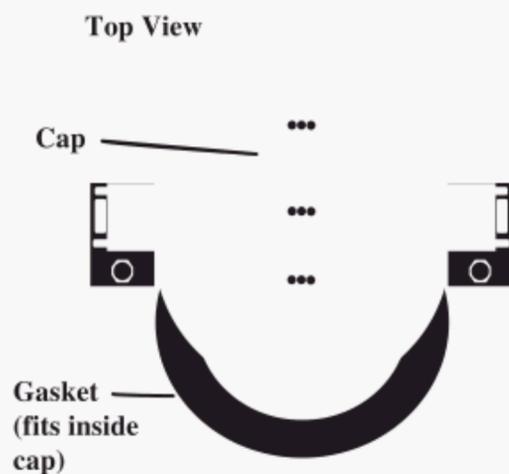


Figure 4—Tank Fill Cap and Gasket

Side View

•

Figure 5—Fill Adapter

5.2.2 Vapor Recovery Fill Adapters

5.2.2.1 Gasoline Fill Adapters

5.2.2.1.1 The fill adapter (see Figure 5) threads onto the fillpipe of the UST fill riser and is installed inside the spill bucket. (See Figure 6.) The adapter provides a connection for the driver to attach the hose to deliver fuel. There are two types of fill adapters: a swivel type and a non-swivel type.

- W 5.2.2.1.2** Check that the fill adapter is securely fastened to the fill riser and makes a tight seal. (See Figures 7A and 7B.)
- W 5.2.2.1.3** Check the adapter for damage or corrosion. Replace damaged, worn, corroded, or defective fill adapters. (See Figures 7A and 7B.)

5.2.3 Vapor Recovery Dry Break Adapter

5.2.3.1 Dual Stage I vapor risers require a dry break adapter with a spring-loaded poppet on the vapor connection that is opened by the tank truck vapor elbow. (See Figure 8.) The dry-break allows cap removal from the adaptor without opening the headspace in the tank to the atmosphere.

- W 5.2.3.2** Check the adapter and poppet for damage, corrosion or foreign material. Ensure that the poppet valve closes properly to form a vapor-tight seal. Additionally, check that the adaptor is securely fastened to the vapor riser. Replace the adapter if the poppet does not seat properly due to wear or corrosion.

5.2.4 Drop Tubes

5.2.4.1 Underground tank drop tubes consist of an aluminum tube, or sleeve, fitted inside the tank's fill pipe and held in place by the fill adapter at the top of the fill pipe. (see Figure 6.) During deliveries, gasoline is introduced into the UST below the liquid surface through the bottom of the drop tube. Submerged tank filling minimizes the generation of vapors and entrainment of liquid gasoline droplets in the vapor space.

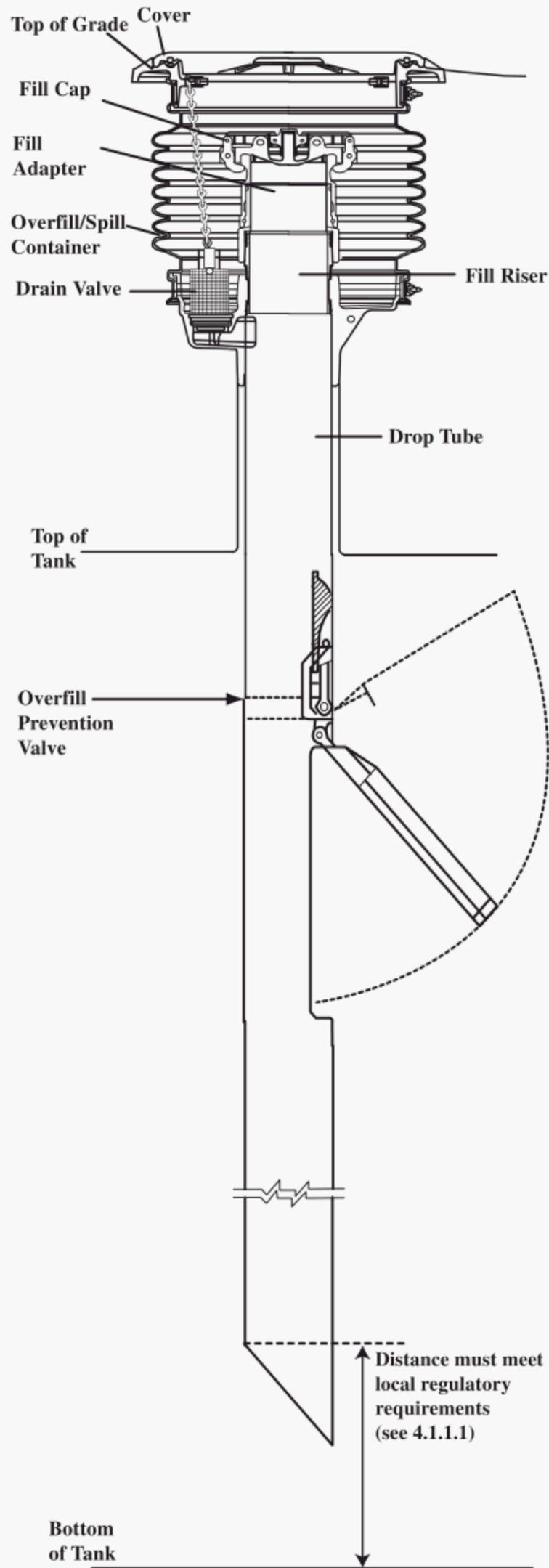


Figure 6—Typical Detail of Fill Pipe with Overfill Prevention Valve and Drop Tube (Dual System)

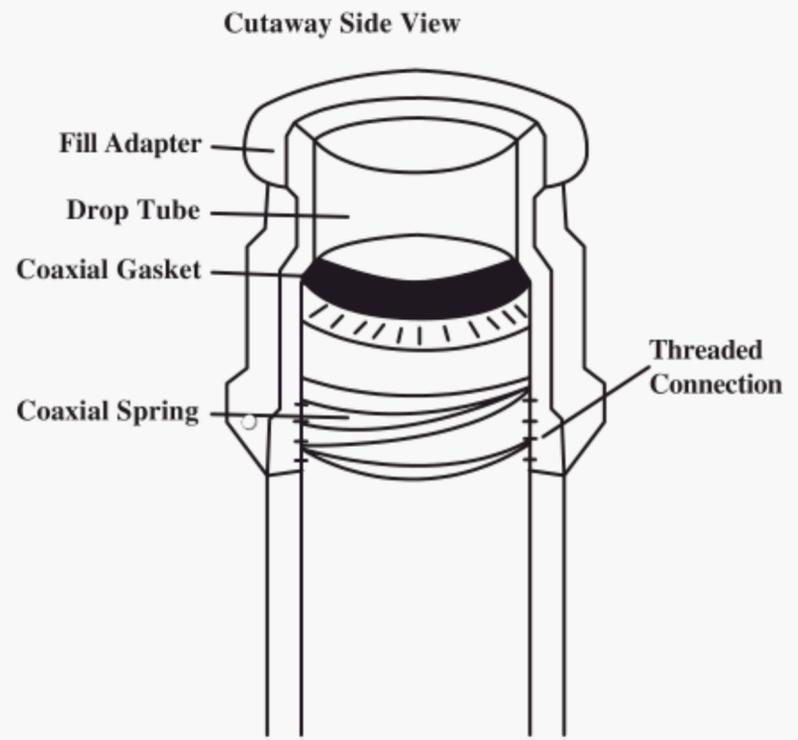


Figure 7A—Coaxial Drop Tube and Gasket

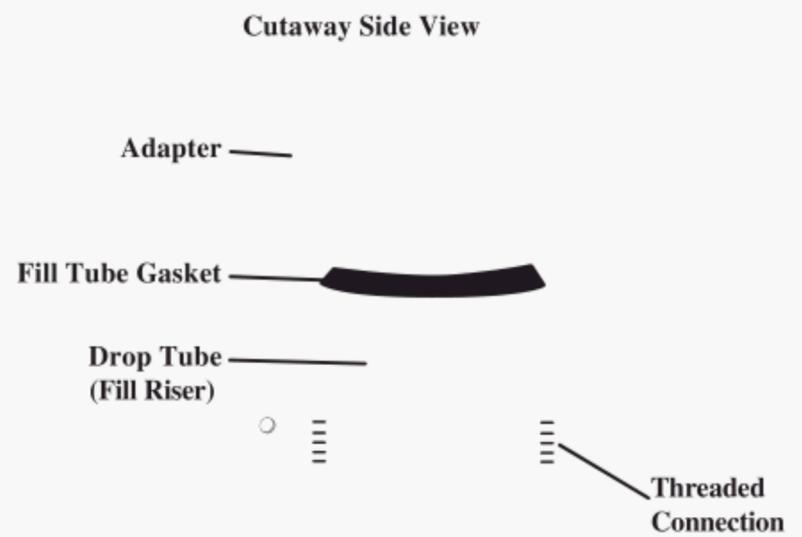


Figure 7B—Gasket Between Adapter and Drop Tube

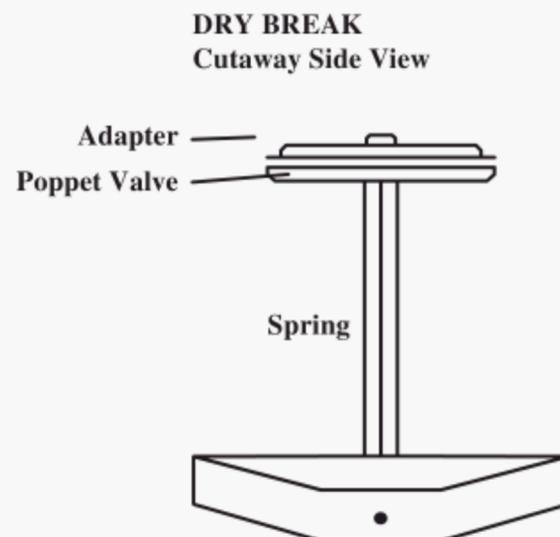


Figure 8—Dry Break Adapter

P/V VALVE**Vent Pipe**

Figure 9A—Pressure/Vacuum Valve (Example 1)

W 5.2.4.2 Visually inspect drop tube openings to ensure they are free from obstruction (e.g., tank gauging sticks, broken gaskets). (See Figures 6, 7A and 7B.)

5.2.5 Spill Containers

5.2.5.1 Spill containers (spill buckets or spill boxes) are installed around tank fills and some vapor adapters to contain small releases that may occur when liquid hoses are disconnected after deliveries. (See Figure 6.)

W 5.2.5.2 Keep overfill/spill containers free of any fuel, water, or debris.

W 5.2.5.3 If present, inspect that the drain valve functions to drain spilled fuel from the spill container and seals properly when not in use.

P/V VALVE**Vent Pipe**

Figure 9B—Pressure/Vacuum Valve (Example 2)

5.2.6 Pressure/Vacuum (P/V) Vent Valves

The P/V valve is installed at the top of the UST vent pipe to reduce the amount of gasoline vapors emitted into the air.

A Confirm that the P/V vent valve is installed properly and is not painted. Painting the valve may hide a required label or damage the operation of the valve. (See Figures 9A and 9B.) Some balance systems do not require P/V valves.

Note: Diesel tank vents do not require P/V valves.

5.3 STAGE II EQUIPMENT

Stage II vapor recovery equipment controls gasoline vapors during fueling of vehicles and returns the vapors to the UST. (See Figure 10.)

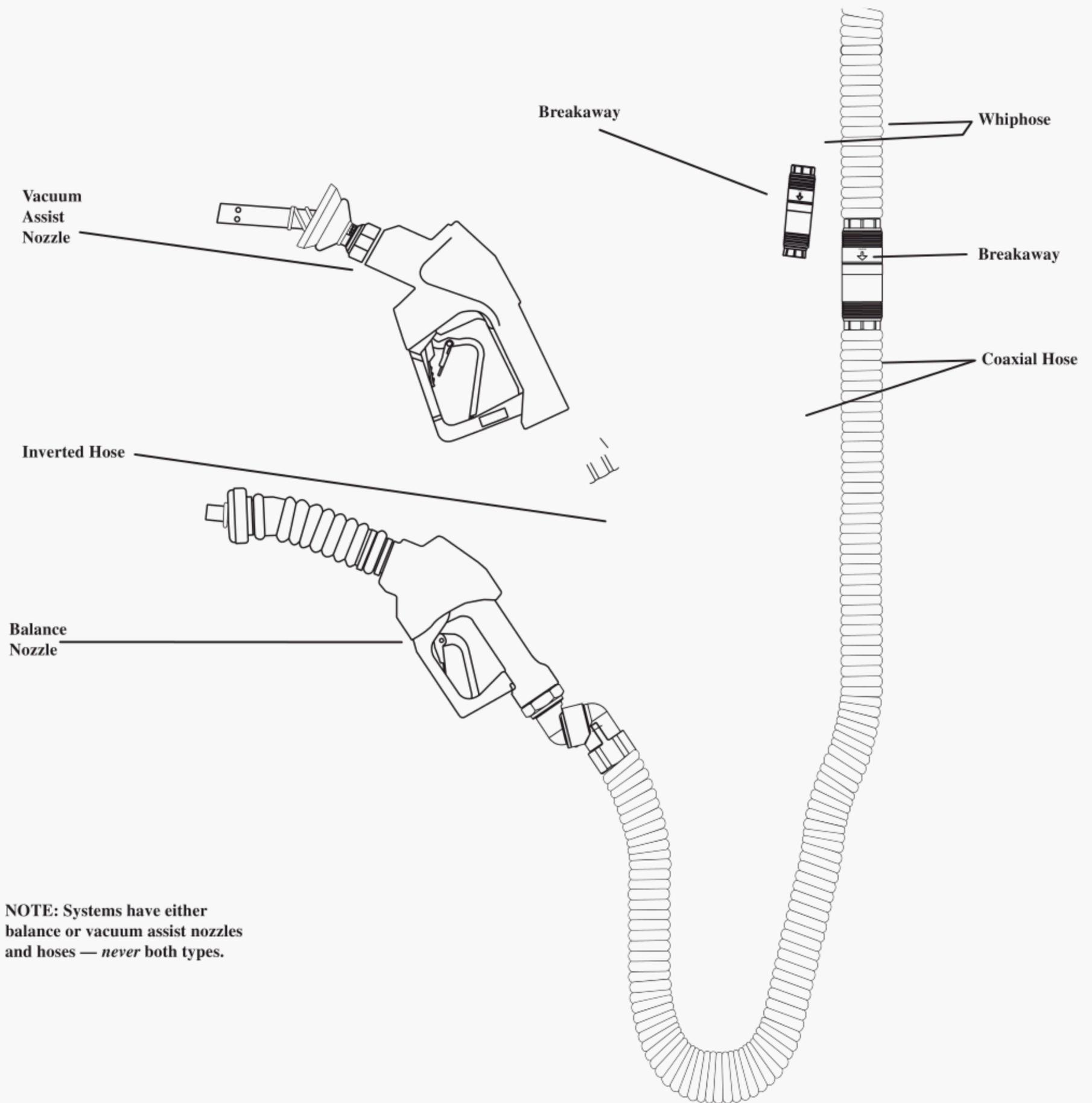


Figure 10—Typical Detail: Hanging Hardware

5.3.1 General

- M 5.3.1.1** Check that dispensing rates are between 5.0 and 10.0 gallons per minute and are in compliance with the vapor recovery system manufacturer's requirements.
- D 5.3.1.2** Visually inspect hanging hardware (i.e., nozzles, hoses, swivels, and breakaways). Equipment should be taken out of service when defects are discovered. See certification documents for guidance.

5.3.2 Nozzles

Nozzles are subject to wear and tear. Inspect nozzles daily. Nozzles should be taken out of service if they are damaged or not functioning properly.

5.3.2.1 All nozzles

- D 5.3.2.1.1** Nozzles are designed to automatically shutoff when the vehicle fuel tank is full. Check that the automatic hold-open latch is present and operational.
- D 5.3.2.1.2** Visually check for leaks and drips at the nozzle. Look at the hose swivel connection (see Figures 11A and 11B) and the nozzle's operating lever (see Figures 13 and 14). Ensure that swivels rotate easily to prevent hose kinks. Replace or repair as necessary.

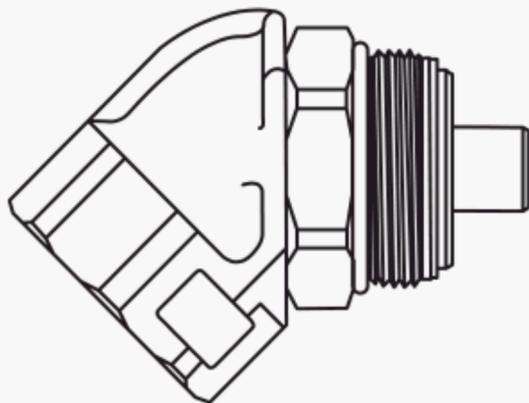


Figure 11A—Nozzle Swivel



Figure 11B—Nozzle Swivel (Configuration 2)

- D 5.3.2.1.3** Check that either the nozzle-retaining spring or spout spring (anchor ring) that holds the nozzle in the fillpipe during refueling is in place. (See Figure 12.)

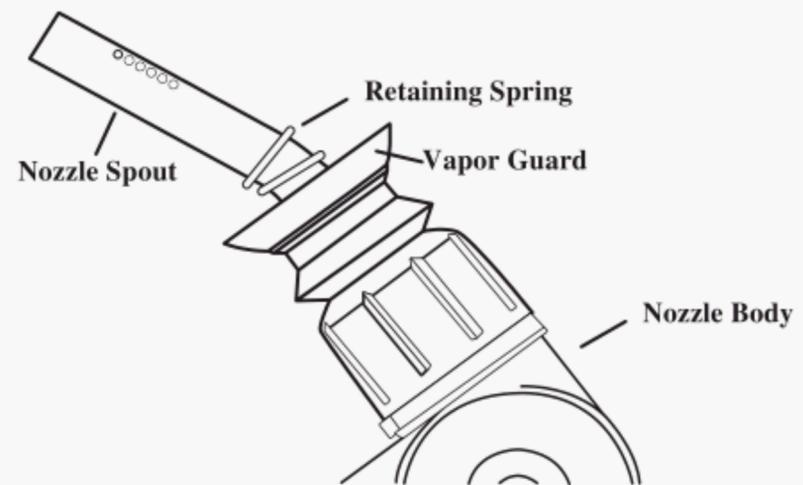


Figure 12—Vapor Assist Nozzle

- D 5.3.2.1.4** Check that the nozzle spout is tightly attached to the nozzle body, and does not wobble or spin when pushing back and forth on the spout tip, and is free of dents that exceed the regulatory allowable limit. (See Figures 13 and 14.)

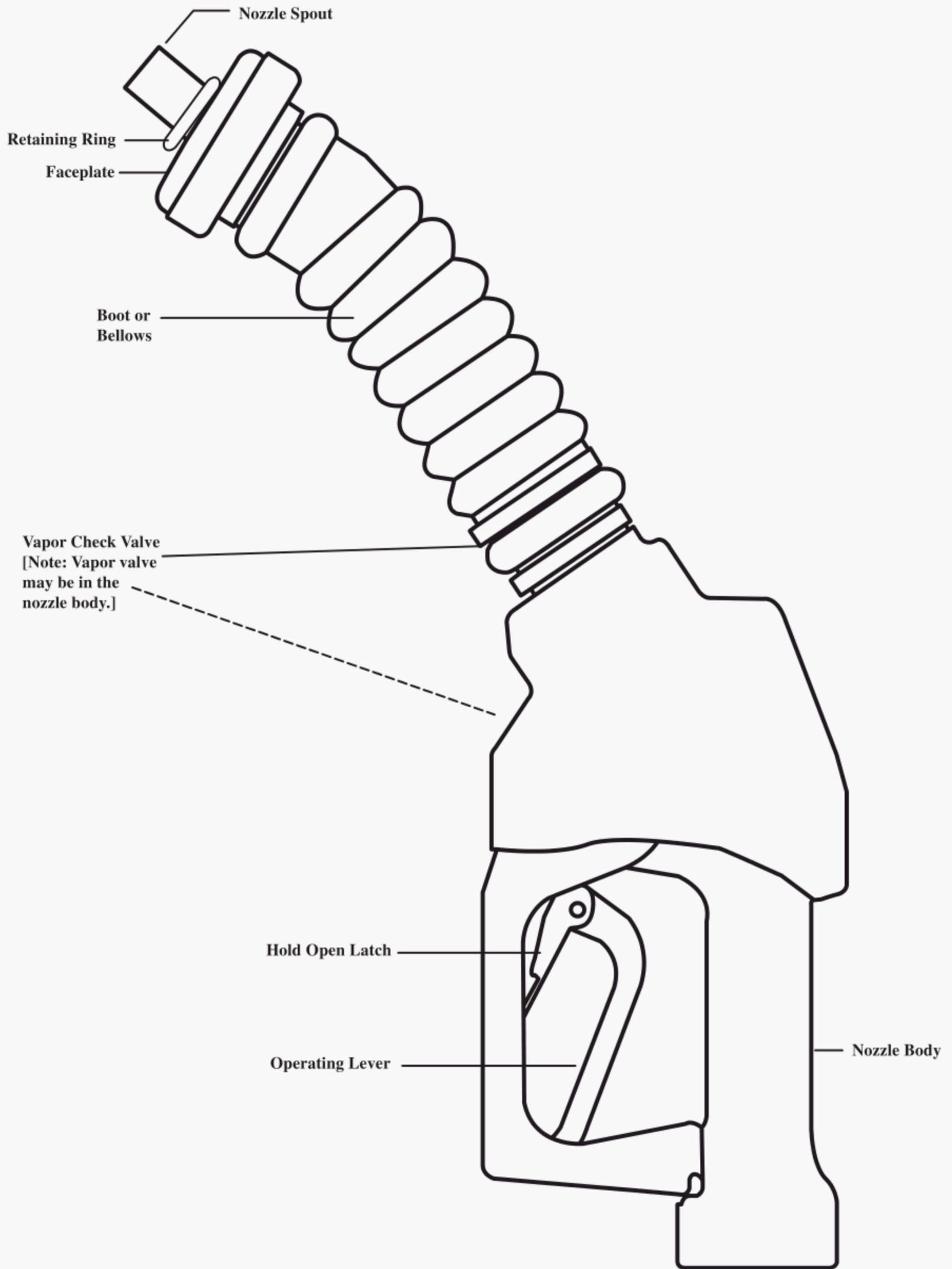


Figure 13—Typical Detail: Balance Nozzle

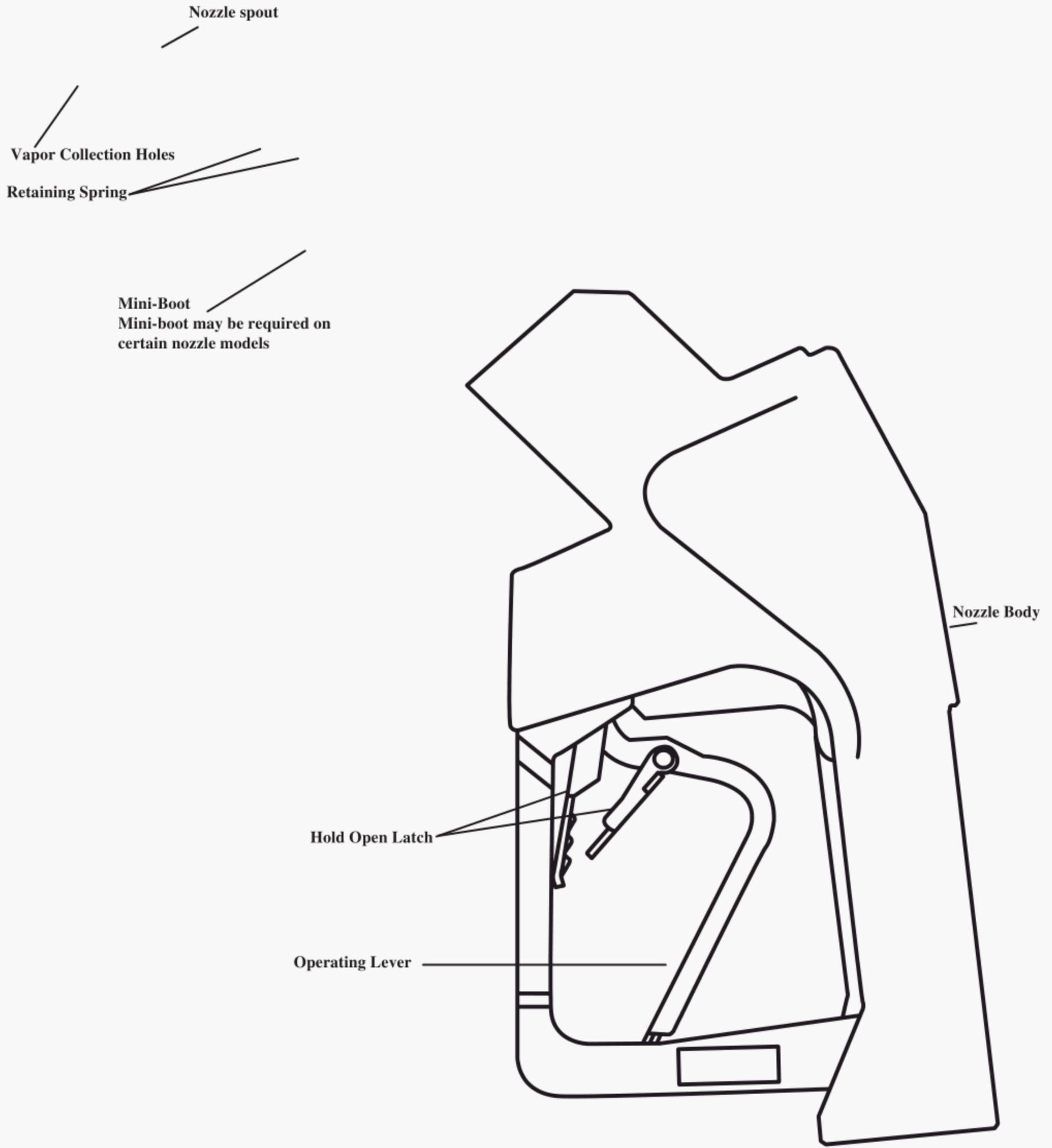


Figure 14—Typical Detail: Vacuum Assist Nozzle with Mini-boot

5.3.2.2 Balance Nozzles

- D 5.3.2.2.1** Balance nozzles have a faceplate that forms a tight fit with the vehicle. The faceplate should be present and should not be damaged beyond one-fourth of the circumference of the faceplate. Replace the boot (also known as a bellows) if any tear equals or exceeds a combined length of $\frac{1}{2}$ inch. (See Figures 13 and 15.)

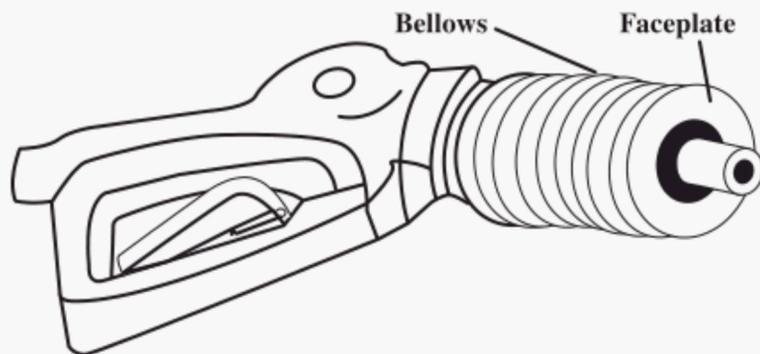


Figure 15—Balance Nozzle

- W 5.3.2.2.2** Interlock. The insertion interlock mechanism should not allow dispensing when the bellow is uncompressed. Verify that the insertion interlock mechanism is functioning properly by following manufacturer instructions for the nozzle type. The insertion interlock mechanism is not visible.

5.3.2.3 Vacuum Assist Nozzle

- D 5.3.2.3.1** Ensure that the vapor collection holes on the spout are unobstructed. A minimum of three open vapor holes are required for most assist nozzles. Consult specific requirements for your nozzles. (See Figures 16A and 16B.) Vapor collection holes may be at the tip or base of the nozzle spout and may not be visible.

5.3.2.3.2

a. Many newer vacuum-assist systems utilize nozzles that have a lower air-to-liquid (A/L) ratio than the older-style nozzle. This is possible due to improved vapor collection using a "mini-boot" on the nozzle spout.

b. In order to meet air quality requirements when using the new nozzles, service technicians must adjust equipment in the dispenser to lower the A/L ratio. This must be done for each fueling point (each side of the dispenser). Once the A/L ratio is lowered, the older-style nozzles without a mini-boot may not be used on that side of the dispenser. For example, once the A/L ratio is lowered for one side of a dispenser, all of the nozzles on that side of the dispenser (if the dispenser has 3 nozzles per side) must be replaced with the new "mini-boot" nozzles.

- D c.** If the dispenser has 3 nozzles on each side, verify that all of the nozzles on each side of the dispenser are similar (all

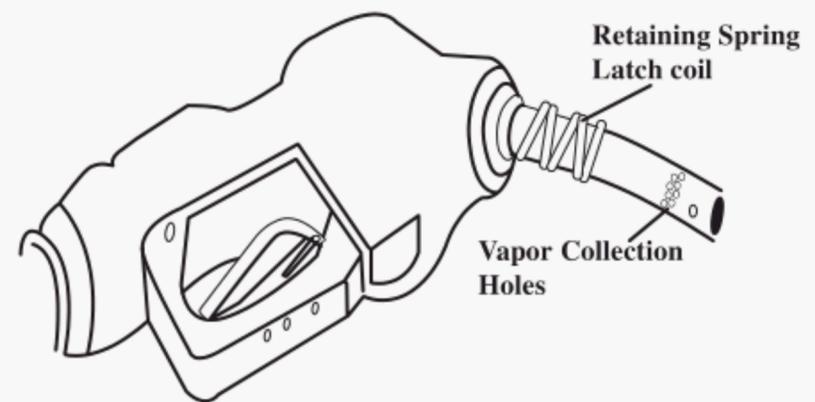


Figure 16A—Vapor Assist Nozzle

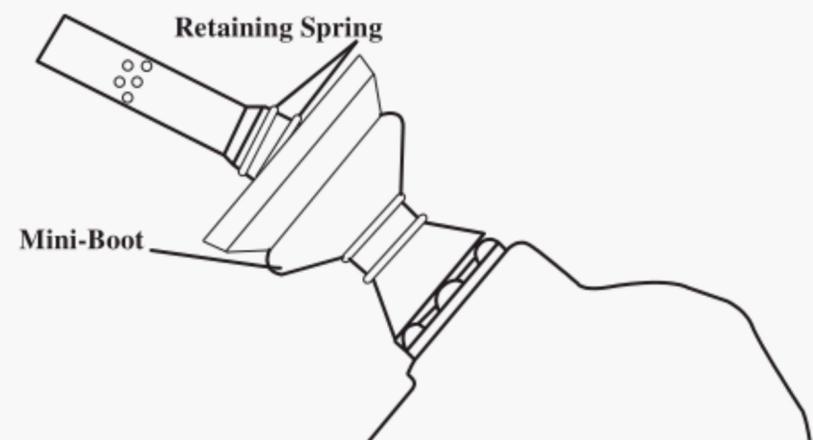


Figure 16B—Vapor Assist Nozzle with Mini-Boot

have a mini-boot present or all nozzles do not have a mini-boot). (See Figure 16A, 16B.)

- D 5.3.2.3.3** Ensure that any mini-boot is not damaged, punctured, ripped, or torn. Some mini-boots must have a small circular hole to prevent sealing at the fill pipe. Specific, allowable maximum damage varies among manufacturers. Consult the manufacturer's literature.

5.3.3 Hoses

5.3.3.1 Coaxial vapor recovery hoses used in balance systems transfer vapors on the outside and product in the inner hose. Some contain an aspirator, or venturi, to remove liquid, which may accumulate in the vapor passage commonly referred to as a liquid removal device. The venturi hoses have one end marked "nozzle end" that must be attached to the nozzle. Inverted vapor recovery hoses used in most assist systems contain product flow in the outer hose and vapors in a small vapor hose on the inside of the product hose. Shorter hose sections—whip hoses—are used between dispensers and other hanging hardware such as breakaways. Older balance systems may still use twin-hose systems consisting of two separate hoses; one for product, the other for vapors.

- D 5.3.3.2** Visually inspect to ensure that hoses are free of leaks, kinks, tears, cuts, and perforations that can affect vapor collection. Repair or replace damaged hoses. (See Figure 10.)

▲
10"
▼

Figure 17—Balance System with Non-venturi Hose

- D 5.3.3.3** If present, ensure hose retractors are functioning properly and that the hose, when hung up, is not exposed to damage from vehicles.
- D 5.3.3.4** Balance hoses should not touch the ground when hung up on the dispenser. Ensure the venturi hoses with one end marked "nozzle end" are attached to the nozzle. Non-venturi hoses cannot exceed a 10-inch length of loop below the nozzle. (See Figure 17.)
- D 5.3.3.5** Monitor that vapor passages of balance hoses are free of liquid. One symptom of this is that the nozzle will have frequent shut-offs. If required, drain the hose or replace it if gasoline blockage persists in the hose. (Ensure that hose installation is in the correct orientation.) (See Figure 10.)
- D 5.3.3.6** Ensure that the proper hose end is connected to the nozzle. Remove and reverse if improperly connected. The venturi in coaxial balance hoses will not function if hose is reversed. (See Figure 10.)

5.3.4 Breakaway Valves

- 5.3.4.1** Breakaway valves are installed in the hanging hardware to block off the flow of liquid and vapor from the dispenser or hose in the event a hose is pulled off a dispenser.
- D 5.3.4.2** Check the direction of flow indicated on the breakaway fitting and confirm it is installed with the correct orientation. Remove and reverse if improperly connected. (See Figures 10 and 18.)
- D 5.3.4.3** Inspect breakaway connections for leaks, visible damage, excessive corrosion, or signs of partial separation. Repair or replace breakaways that show signs of deterioration, damage, or partial separation.

5.3.5 Vacuum Pumps

- a. Vacuum pumps assist the flow of vapors by pulling them from the car and pushing them back to the underground tank. They are located in the dispenser or at a remote location. A qualified service technician should perform any maintenance, adjustments, or repairs.

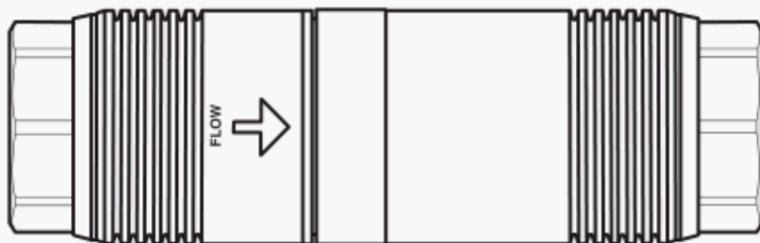


Figure 18—Breakaway Valve

- D b.** Be observant of the presence of unusually strong gasoline odors during fueling. Strong odors may indicate a malfunctioning vapor pump or other defect in the vapor collection system. A qualified service technician should perform any maintenance, adjustments, or repairs.

5.3.6 Vapor Processors

Several Stage II vapor recovery systems have remote vapor processors to control emissions. A qualified service technician should perform maintenance, adjustments, or repairs to this equipment.

- D 5.3.6.1** Check the system control panel and ensure that the vapor processing unit is operating normally and not in alarm status. Contact a qualified service technician for any required testing, adjustments, or work.
- D 5.3.6.2** If the control panel of a vapor processor indicates an alarm condition, consult the operating manual regarding system operation and contact a qualified service technician immediately.

5.4 INSPECTION CHECKLISTS

- D 5.4.1** All inspections should be documented in writing. Appendix A provides suggested inspection checklists.
- D 5.4.2** Unloading procedures are provided in API RP 1007 *Loading and Unloading of MC306/DOT 406 Cargo Tank Motor Vehicles* and may be provided to tank truck drivers.

6 Record-keeping and Permitting

6.1 GENERAL

A record of all equipment inspections, maintenance, or repairs should be maintained at the station, be accessible within 24 hours, or as required by local or state regulations.

Vapor recovery systems should be inspected and tested on a regular schedule based on local/state requirements and recommendations by the manufacturer.

The owner/operator should check to ensure that any air quality operating permit has not expired and the facility is in compliance with permit conditions.

6.2 RECORD RETENTION

Requirements for record retention vary with local jurisdiction and may include:

- 6.2.1** All current licenses and permits.
- 6.2.2** Current proof of training in equipment inspection procedures.
- 6.2.3** Installation and compliance testing results.
- 6.2.4** Inspection records on forms approved by the local jurisdiction.

6.2.5 Maintenance records on forms approved by the local jurisdiction.

6.3 RECOMMENDED RECORDS RETENTION

Retain records of all equipment inspections, maintenance, or repairs for a minimum of 2 years or as required by company policy or local/state requirements.

7 State Vapor Recovery Requirements

Many states require vapor recovery systems and replacement parts certified by CARB or that are approved by the state environmental agency. Requirements for vapor recovery vary considerably depending on the jurisdiction and may require periodic third-party testing. Owners/operators should review all local/state regulations for specific compliance requirements.

APPENDIX A—INSPECTION CHECKLISTS

APPENDIX B—DEFINITIONS AND ACRONYMS

B.1 Definitions

B.1.1 assist system: A vapor recovery system that employs a pump, blower, or other vacuum producing devices to collect and/or process vapors.

B.1.2 balance system: A vapor recovery system that uses direct displacement to collect, transport, and/or process vapors generated during product transfer.

B.1.3 bellowless nozzle: Any nozzle used with a vacuum assist system to capture gasoline vapors at the motor vehicle filler neck without flexible bellows.

B.1.4 bootless nozzle: A type of vapor recovery nozzle that does not have a bellows, or “boot,” over the length of the nozzle spout. (See “bellowless” nozzle).

B.1.5 breakaway coupling or valve: A component attached to the coaxial or inverted hose that allows the safe separation of the hose from the dispenser in the event of a forced removal such as in the case of a “drive-off.”

B.1.6 CARB Certified or Certified by CARB: A Stage I or Stage II vapor recovery system, equipment, or any component thereof, for which the California Air Resources Board has evaluated its performance and issued a valid Executive Order or approval letter.

B.1.7 coaxial (submerged) fill tube: A fill tube that contains two concentric passages. The center passage transfers gasoline to the storage tank and the outer passage carries the gasoline vapors to the tank truck or trailer.

B.1.8 coaxial hose: A hose that contains two concentric passages, one within the other. The inner passage dispenses the liquid gasoline into the vehicle fuel tank while the outer passage carries the gasoline vapors from the vehicle fuel tank to the storage tank.

B.1.9 dispenser: A unit housing the aboveground gasoline and vapor recovery piping, the meters, controls and registers which provides fittings to hang hoses and nozzles when they are not in use.

B.1.10 dry break: A normally closed Stage I vapor recovery component installed on the underground vapor riser that opens when connected to a mating vapor elbow fitting. Also referred to as a poppet valve.

B.1.11 Executive Order: A document issued by the CARB Executive Officer to certify a vapor recovery system. (CARB)

B.1.12 fill pipe (or drop tube): The tank opening where fuel is delivered into the underground storage tank. A submerged fill pipe has its discharge opening entirely covered

when the liquid level in the tank is twelve inches above the bottom.

B.1.13 fueling position: A fuel dispensing unit consisting of one or more nozzles and meters capable of delivering only one fuel product at one time.

B.1.14 headspace: The volume of the underground storage tank above the liquid product (ullage).

B.1.15 hold-open latch: An integral part of a dispensing nozzle designed to allow hands-free dispensing of gasoline.

B.1.16 incinerator: A processor used on some vapor-assist systems and designed to eliminate hydrocarbon emissions by any kind of oxidation. Also called a thermal processor.

B.1.17 insertion interlock: An integral part of a vapor recovery nozzle which prohibits the dispensing of fuel unless the bellows has been compressed against the vehicle to make a seal.

B.1.18 inverted hose: A coaxial hose (hose within a hose) in which gasoline flows through the space between the inner and outer hose while vapors are returned through the inner hose.

B.1.19 liquid removal device: A device designed to remove liquid from the vapor return portion of a coaxial vapor hose used with balance systems.

B.1.20 mini-boot: A device that is permanently installed at the base of certain vapor recovery nozzle spouts to enhance the effectiveness of vapor collection.

B.1.21 multi-product dispenser: A dispenser capable of delivering two or more product grades.

B.1.22 overfill prevention device: A device designed to stop or restrict the delivery of product to a storage tank to prevent the over-filling and potential spills.

B.1.23 Phase I or Stage I: Control of vapors generated during the transfer of gasoline from a transport tank to the gasoline dispensing facility tank.

B.1.24 Phase II or Stage II: Control of vapors generated during the transfer of gasoline to a vehicle fuel tank.

B.1.25 pressure/vacuum relief valve (P/V valve): A valve installed on the vent riser of gasoline storage tanks designed to prevent vapor emissions and relieve pressure or vacuum build-up at preset values.

B.1.26 spill bucket: An enclosed container around a fill or Stage I connection that is designed to collect gasoline spillage resulting from disconnection between the liquid gasoline

delivery hose and the fill pipe. Also referred to as a spill/overflow device, fill bucket, spill container, fill box, or, in CARB documents, a spill box.

B.1.27 two-point (dual) system: A Stage I vapor recovery system that delivers gasoline into storage tanks and recovers the displaced vapors through separate tank risers.

B.1.28 ullage: The volume of the underground storage tank above the liquid product (headspace).

B.1.29 underground storage tank (UST): Any single or combination of tanks, including pipes connected thereto, used for the storage of gasoline and which is located below grade.

B.1.30 vapor recovery system: A vapor gathering system capable of collecting the hydrocarbon vapors otherwise emitted during fuel delivery and vehicle refueling activities.

B.1.31 vent: Piping that connects the headspace of a UST to the atmosphere.

B.2 Acronyms

A/L Ratio or A/L: Air to liquid ratio

ARB or CARB: California Air Resources Board

EO: Executive Order (CARB)

EPA: Environmental Protection Agency

PV or P/V Valve: Pressure/vacuum relief vent valve

UST: Underground storage tank

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