California Environmental Protection Agency
Air Resources Board

Compliance Division

Advisory

Gasoline Vapor Recovery Diagnostic Tools

Number 179 November 27, 2000

Air Resources Board Diagnostic Tools for Vapor Recovery

The Air Resources Board Compliance Division Staff recommends that, air district inspectors use the diagnostic tools listed below to evaluate the integrity of gasoline vapor recovery equipment. In the event equipment failures are identified by utilizing these tools, any enforcement action and assessment of penalties is at the discretion of the local air district. These diagnostic tools can also be used by gasoline facility operators to assist them in assessing the integrity of their vapor recovery equipment. If an operator chooses to use these diagnostic tools for compliance assurance purposes, it is the responsibility of the operator to correct any problems that are discovered. The gasoline facility operator is not required to report these corrective actions to the local air district unless otherwise specified by district rule and/or permit condition.

- The Ring Test
- The Bag Test for Multi-Nozzle Vacuum Assist Systems (Bay Area AQMD GDF-01)
- The Bag Test for Single-Nozzle Vacuum Assist Systems (Bay Area AQMD GDF-02)
- The Squeeze Bulb Test (Bay Area AQMD GDF-03)

Ring Test

The ring test uses an industry standard round gauge to check the roundness of the spout. Federal law requires that the spouts remain within a certain tolerance to allow for proper insertion into the vehicle fill pipe. Out-of-round spouts may affect the integrity of the vapor recovery system.

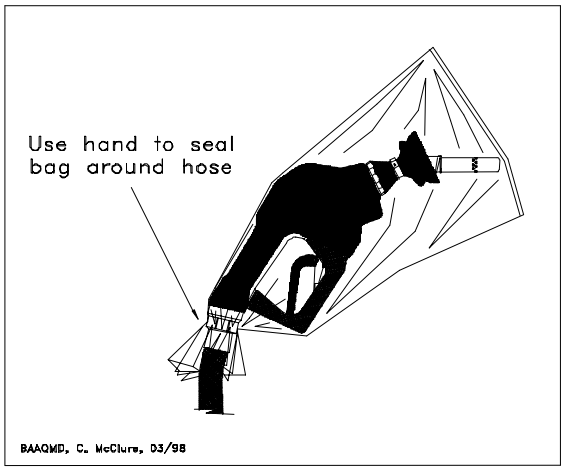
This simple procedure entails the passing of a metal ring from the tip of the spout to beyond the vapor recovery holes of the spout. A dent or bend will prevent the ring's passage over the entire spout.

The Bag Tests

The Bay Area AQMD inspection procedures contain two methods of detecting leaking nozzles by sealing them with a plastic bag. The first method [IP GDF-01 (enclosed)] is intended for use with multi-nozzle vacuum assist systems and the second [IP GDF-02 (enclosed)] is for use with single-nozzle vacuum assist systems. The bag tests provide a method to determine if bootless vacuum assist vapor recovery nozzles allow air ingestion into the vapor recovery system, which degrades its performance during vehicle refueling. The procedures can also isolate the sources of air leakage.

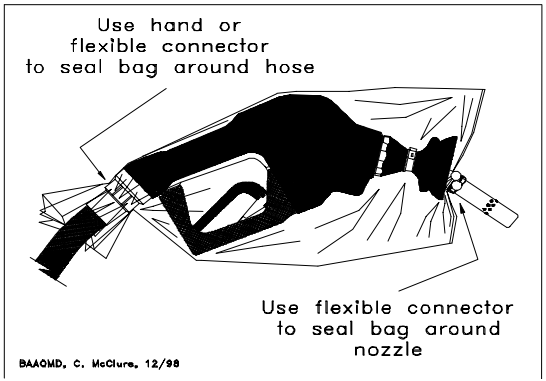
Bag Test for Multi-Nozzle Vacuum Assist Systems

The multi-nozzle version of the bag test can be used on dispensers that have three nozzles on each side with built-in integral check valves. This procedure cannot be used on single nozzle dispensers or passive systems such as a balance system. If the vapor recovery pump is not operational or the vapor passage of the hose has a column of gasoline larger than the vacuum capabilities of the vacuum pump, a leaking nozzle may not be detected. The nozzle being tested and the nozzle dispensing fuel must be connected to the same common vapor piping and vacuum pump.



To conduct this test, a plastic bag (10 to 12 inches in width, 18 to 20 inches in length and 1.5 to 4 mils thick) is placed over the nozzle and sealed around the hose at the base of the nozzle. The bag is observed while another nozzle on the same side of the dispenser dispenses at least 2.5 gallons of fuel into a vehicle. If the bag shows a definite collapsing during the dispensing event, there is a leak in the bagged nozzle causing ingestion of air into the vapor recovery system. Ingestion of air will reduce nozzle vapor recovery effectiveness and increase gasoline evaporation in the system.

Some models of dispensers cannot set the price-per-gallon if more than one nozzle is removed from the dispenser holster. To conduct the test in this case, wait until the price has been set by the dispenser before removing and bagging the nozzle to be tested.



Bag Test for Single-Nozzle Vacuum Assist Systems

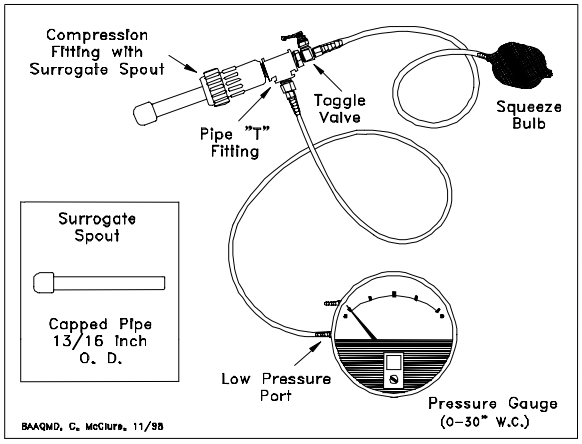
The single-nozzle version of the bag test can be used as an inspection procedure to

provide a method to determine if a bootless Phase II vacuum assist vapor recovery nozzle allows air ingestion into the vapor recovery system. This version is to be used on dispensers with a single nozzle on each side. As with the multi-nozzle version of the bag test, if the vapor recovery vacuum pump is not operational or the vapor passage of the hose has a volume of gasoline larger than the vacuum capabilities of the vacuum pump, a leaking nozzle may not be detected.

To conduct the test, place a plastic bag (10 to 12 inches in width, 18 to 20 inches in length and 1.5 to 4 mils thick) over the nozzle, with the spout extending through a small hole in the sealed end of the bag. Secure the bag at both the spout and base of the nozzle. Start dispensing fuel with the nozzle, latch the nozzle in the high-clip dispensing mode and observe the bag while dispensing at least 2.5 gallons of fuel into a vehicle. If the bag shows definite collapsing during the dispensing event, there is a leak in the nozzle, causing ingestion of air into the vapor recovery system.

Squeeze Bulb Test

The "Squeeze Bulb Test" [GDF-03 (enclosed)] provides a method to determine if bootless Phase II vacuum assist vapor recovery nozzles or remote vapor check valves allow air ingestion into the vapor recovery system. This procedure is applicable to those bootless systems that utilize a remote vapor check valve; it is not applicable to passive vapor recovery systems such as balance systems nor is it applicable to systems that utilize nozzles with built-in check valves. When used in conjunction with the bag test, this procedure can isolate certain sources of air leakage.



To conduct this test, place a compression fitting, or Air-to-Liquid (A/L) adaptor over the nozzle spout, isolating the vapor collection holes (Figure 404.3). Use the squeeze bulb to create a vacuum of fifteen (15.0) plus or minus one (1.0) inches H_2O at the vapor collection holes on the nozzle spout. Close the toggle valve to isolate the squeeze bulb and eliminate it as a possible decay source. If the vacuum (as indicated by the pressure/vacuum gauge on the test assembly) decreases by more than one (1.0) inch H_2O in ten seconds, there is an unacceptable leak between the nozzle spout and the remote vapor check valve, inclusive. If the nozzle spout is deformed such that the vapor collection ports cannot be isolated, the inspection procedure will be biased to indicate noncompliance.

Frequency of Testing:

- Monthly performance testing of all installations.
- After three consecutive monthly passes, quarterly testing.
- After two consecutive quarterly passes, semi-annual testing.
- Semi-annual testing will be the minimum requirement.
- Any single failure will trigger monthly testing.