Executive Order G-70-175

Hasstech VCP-3A Phase II Vapor Recovery System for Aboveground Tank Vapor Recovery Systems

Exhibit 3

STATIC PRESSURE INTEGRITY TEST ABOVEGROUND STORAGE TANKS

APPLICABILITY

This test procedure is used to quantify the vapor tightness of any aboveground storage tank installed at a gasoline dispensing facility (GDF). Leaks in a balance Phase II system may cause excessive vapor emissions. Leaks in a vacuum assist Phase II system may decrease the efficiency of the vapor collection and/or processing system.

PRINCIPLE AND SUMMARY OF TEST PROCEDURE

Nitrogen is introduced via the vent pipe until the entire vapor recovery system is pressurized to two (2.0) inches water column. The pressure is then allowed to decay for five (5) minutes. The acceptability of the final pressure is based upon the vapor system ullage. Single wall storage tanks at bulk plants may already be pressurized during daylight hours due to diurnal heating. This test may not be used in this instance and vapor tightness will be determined by checking for leaks with a TLV sniffer (or other hydrocarbon detector), a liquid bubble solution (such as "Snoop"), and/or other techniques.

BIASES AND INTERFERENCES

For vaulted aboveground tanks equipped with vacuum-assist Phase II systems, the processor must be isolated and the vapor system capped. Leakage at these points will indicate a system component leak.

SENSITIVITY, RANGE AND PRECISION

1. Sensitivity

   a. **Inclined Liquid Manometers and Electronic Pressure Meters**

      Maximum incremental graduations at, above, and below a pressure observation shall be 0.01 inches water column ("WC).

      The maximum bias shall be plus-or-minus one-half percent (±0.5%) of full-scale.

   b. **Mechanical Spring Diaphragm Pressure Gauges**

      The minimum diameter of the pressure gauge face shall be 4 inches.

      Maximum incremental graduations at, above, and below a pressure observation shall be 0.05 "WC.

      Each such graduation shall be defined as the resolution, P_{Res}, of a pressure observation.

      The maximum bias shall be plus-or-minus two percent (±2%) of full-scale.

2. **Range**

a. **Pressure**

The pressure range in Table 1 is 0.16 to 1.93 inches water column ("WC).

b. **Volume Flow**

The minimum and maximum nitrogen feed-rates, into the system, shall be one (1) and five (5) CFM, respectively.

3. **Precision**

The precision of a pressure observation shall affect the compliance status of a system as described below, where:

$P_{req@t}$ ≡ pressure requirement, at a specified time, per the appropriate certification procedure, rounded to the nearest integral multiple of P_{Res},

and

$P_{obs@t}$ ≡ pressure observation, at the specified time.

The precision for a pressure observation shall be one-half of P_{Res}.

$P_{obs@t}$ shall be an integral multiple of P_{Res}.

Non-Compliance with a pressure requirement shall be determined when, at a specified volume flow:

$$_{Req@t} - P_{Obs@t} \geq P_{Res}.$$

EQUIPMENT

1. **Pressure Meters**

At least two types of pressure meters can meet the precision specifications:

a. inclined liquid manometers; and

b. electronic meters using pressure transducers.

2. **Nitrogen**

Use commercial grade nitrogen in a high pressure cylinder, equipped with a two-stage pressure regulator and a one psig pressure relief valve.

3. **Vent Pipe Pressure Assembly**

See Figure 1 for example.

4. **Stopwatch**

Use a stopwatch accurate and precise to within 0.2 seconds.

CALIBRATION PROCEDURE

Follow manufacturers instructions.

PRE-TEST PROTOCOL

1. Dispensing shall not take place during the test. There shall have been no bulk deliveries to the storage tanks within the three hours prior to the test.

2. Measure the gasoline volume in each aboveground storage tank and determine the actual capacity of each storage tank. Calculate the ullage space for each tank by subtracting the gasoline volume present from the actual tank capacity. The minimum ullage during the test shall be 25 percent of the tank capacity or 300 gallons, whichever is greater. If applicable, the vent pipes may be manifolded during the test to achieve the required ullage.

3. For two-point Phase I systems this test shall be conducted with the dust cap removed from the vapor coupler. This is necessary to insure the vapor tightness of the vapor poppet.

4. 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 vapor poppet.

   a. 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 assembly installed.

   b. Carefully remove the vent pipe pressure/vacuum valve. Install the vent pipe pressure assembly (see Figure 1).

TEST PROCEDURE

This test procedure is based on direct measurements only; no sampling, recovery, or analysis is involved.

1. Open the nitrogen gas supply valve, regulate the delivery pressure to at least 5 psig, and pressurize the vapor system (or subsystem for individual vapor return line systems) to or slightly above 2 inches water column. It is critical to maintain the nitrogen flow until both flow and pressure stabilize, indicating temperature and vapor pressure stabilization in the tanks. Close the nitrogen supply valve.

2. Check the vent pipe pressure assembly using leak detecting solution to verify that the test equipment is leak tight.

3. Re-open the nitrogen supply valve, and reset the tank pressure to reestablish a pressure slightly greater than 2 inches water column. Close the nitrogen supply valve and start the stopwatch when the pressure reaches an initial pressure of 2.0 inches of water column.

4. At one-minute intervals during the test, record the system pressure. After five minutes, record the final system pressure. See Equation 11.1 or Table 1 to determine the acceptability of the final system pressure results.

5. If the system failed to meet the criteria set forth in Table 1, 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.

6. If the compartments in the vaulted tanks are not manifolded, repeat the test for each of the compartments, using the appropriate vent pipe.

   Carefully remove the vent pipe pressure assembly. Allow any remaining pressure to be relieved through vent pipe(s) to minimize exposure to benzene. Keep all potential ignition sources away from the vent pipe(s). Carefully reinstall the pressure/vacuum relief valve.

   Use Equation 11.1 or Table 1 to determine the compliance status of the facility by comparing the final five minute pressure with the minimum allowable pressure.

Minimum Allowable Pressure

The minimum allowable pressure after five (5) minutes, with an initial pressure of 2.0 inches H_2O, shall be calculated as shown below, or obtained from Table 1:

$$P_2 = 2e^{(-760.490/Vu)}$$

Where:

P_2	=	The minimum pressure after 5 minutes, inches H_2O
V_u	=	The ullage of the system, gallons
e	=	Constant equal to 2.71828
2	=	The initial starting pressure, inches H_2O
-760.490	=	Decay constant for a 5 minute test

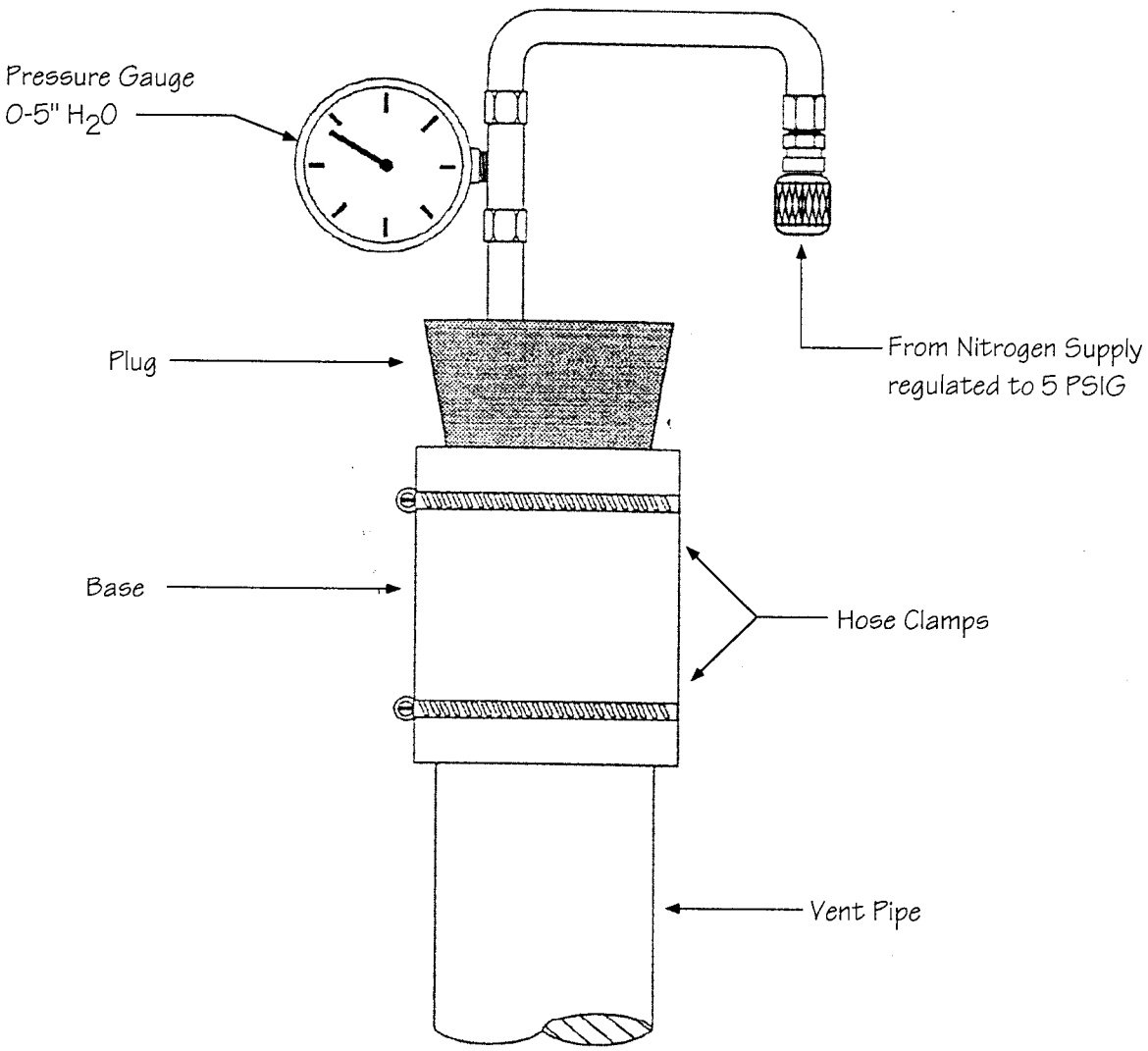
TABLE 1
Leak Rate Criteria

ULLAGE (GALLONS)	MINIMUM PRESSURE AFTER 5 MINUTES, (INCHES OF H_2O)	ULLAGE (GALLONS)	MINIMUM PRESSURE AFTER 5 MINUTES, (INCHES OF H_2O)
300	**0.16**	**1,800**	**1.31**
350	0.23	2,000	1.37
400	**0.30**	**2,200**	**1.42**
450	0.37	2,400	1.46
500	**0.44**	**2,600**	**1.49**
550	0.50	2,800	1.52
600	**0.56**	**3,000**	**1.55**
650	0.62	3,500	1.61
700	**0.67**	**4,000**	**1.65**
750	0.73	4,500	1.69
800	**0.77**	**5,000**	**1.72**
850	0.82	6,000	1.76
900	**0.86**	**7,000**	**1.79**
950	0.90	8,000	1.82
1,000	**0.93**	**9,000**	**1.84**
1,200	1.06	10,000	1.85
1,400	**1.16**	**15,000**	**1.90**
1,600	1.24	20,000	1.93

REPORTING RESULTS

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

Figure 1
Vent Pipe Pressure Assembly



Form I
Summary of Source Test Data

SOURCE INFORMATION		FACILITY PARAMETERS
GDF Name and Address _____ _____ _____	GDF Representative and Title GDF Phone No. ( )	PHASE II SYSTEM TYPE (Check One) Balance ____ Hirt ____ Red Jacket ____ Hasstech ____ Healy ____ Other ____
Permit Conditions	Source: GDF Vapor Recovery System GDF# _____ A/C # _____	Manifolded? Y or N

Operating Parameters

Number of Nozzels Served by Tank #1 _____ Number of Nozzels Served by Tank #3 _____

Number of Nozzels Served by Tank #2 _____ Number of Nozzels Served by Tank #4 _____

Applicable Regulations:	VN Recommended:

Source Test Results and Comments

TANK #:	1	2	3	4
1. Product Grade				
2. Actual Tank Capacity, gallons				
3. Gasoline Volume				
4. Ullage, gallons (#2-#3)				
5. Initial Pressure, inches H_2O				
6. Pressure After 1 Minute, inches H_2O				
7. Final Pressure After 2 Minutes, inches H_2O				
8. Allowable Final Pressure				

Test Conducted by:	Test Company:	Date of Test: