California Environmental Protection Agency

Air Resources Board

Vapor Recovery Test Procedure

TP - 205.1

DETERMINATION OF EFFICIENCY OF PHASE I VAPOR RECOVERY SYSTEMS OF NOVEL FACILITIES

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Determination of Efficiency of Phase I Vapor Recovery Systems of Novel Facilities

1 APPLICABILITY

A set of definitions common to all certification and test procedures is in:

D-200 **Definitions for Certification Procedures and Test Procedures for Vapor Recovery Systems**

For the purpose of this procedure, the term "ARB" refers to the State of California Air Resources Board, and the term "ARB Executive Officer" refers to the Executive Officer of the ARB or his or her authorized representative or designate.

1.1 General

This procedure applies to novel vapor recovery systems for controlling gasoline vapors emitted during the filling of gasoline storage tanks and loading of transport tanks (Phase I).

Vapor recovery systems are complete systems and shall include all necessary piping, nozzles, couplers, processing units, storage tanks and any other equipment necessary for the control of gasoline vapors during fueling operations. This procedure applies to any vapor emissions associated with the dispensing of any fluid, although it is written to reflect application to the hydrocarbon (HC) vapors associated with the dispensing of gasoline at facilities with balance, hybrid, or assist type vapor recovery systems.

1.2 Modifications

Additional modifications may be required for unique installations. Any modification of this method shall be subject to approval by the ARB Executive Officer.

2 PRINCIPLE AND SUMMARY OF TEST PROCEDURE

2.1 Principle

The purpose of this test procedure is to determine the percent vapor recovery efficiency for a vapor recovery system on a gasoline storage tank. During fuel delivery to the gasoline storage tank, the volume of gasoline delivered from the cargo tank to the gasoline storage tank is recorded and the concentration of gasoline vapor returning to the cargo tank is measured. During fuel delivery to a transport tank, the volume of gasoline delivered from the gasoline storage tank to the cargo tank is recorded and the concentration of gasoline vapor returning to the storage tank is measured. The weight of gasoline vapor discharged from the vent of the gasoline storage tank and, if applicable, from the vent of any secondary processing unit during the same period is determined. The percent vapor recovery efficiency is the percent of vapors displaced by fuel transfer which are recovered by a vapor recovery system rather than emitted to the atmosphere.

This is done by determining the vapor mass flux through three significant areas:

$m_{(1)}$ = the mass flux through the vapor return line;

$m_{(2)}$ = the mass flux through the vent and/or assist processor; and

$m_{(3)}$ = the mass flux through the vapor incinerator.

The percent vapor recovery efficiency is determined as follows:

$$\%\ \text{vapor recovery efficiency} = \frac{m_{(1)} - [m_{(2)} + m_{(3)}]}{m_{(1)}} \times 100\%$$

2.2 Summary

As required to determine an emissions parameter and except where otherwise specified, the equipment and procedures specified in the following test methods shall be used.

EPA Method 2A

EPA Method 2B

EPA Method 18

EPA Method 25A

EPA Method 25B

3 BIASES AND INTERFERENCES

Before and after the performance of all other field data collection for this test procedure, the subject dispensing facility shall demonstrate compliance with the appropriate static pressure performance standard if required by CP-205 Section 4.

4 SENSITIVITY, RANGE, AND PRECISION

The measurements of concentration and volumetric parameters required by this test procedure are well within the limits of sensitivity, range, and precision of the specified equipment.

5 EQUIPMENT

Equipment specifications are given below.

5.1 Hydrocarbon Analyzer

The range of any hydrocarbon analyzer shall be selected such that the maximum concentration measured is no more than 90 percent of the range and the average concentration is no less than 10 percent of the range.

Any sampling and analysis system using a non-dispersive infrared detector (NDIR) shall be designed so that 100% of the sample that is extracted for analysis can be returned, unaltered, to the sample manifold.

An analyzer with a NDIR with selected filters to block methane measurement shall be used when the efficiency is to be calculated for non-methane hydrocarbon and when the system under test is small such that extracting a sample for a FID analyzer will affect the system operating parameters. When using a NDIR instrument for total hydrocarbon measurements, a second channel must be present to measure the methane concentration or the instrument filters must be such that total hydrocarbon is measured.

Any sampling and analysis system using a flame ionization detector (FID) can not be designed so that 100% of the sample that is extracted for analysis can be returned, unaltered, to the sample manifold, because the operation of the FID significantly alters the portion of the sample which is analyzed.

An analyzer with a FID may be used for the test when a measurement is for total hydrocarbon and there is no requirement for returning sample, unaltered, to the sample manifold. ~~An important example is the total hydrocarbon measurement on the diluted sample from a test sleeve which has captured transfer emissions from the nozzle fillpipe interface. In this case, the transfer emissions are on their way to a sample manifold.~~

5.2 Carbon Monoxide Analyzer

Use a NDIR analyzer for measurement of exhaust CO concentrations. To the extent practical, the analyzer range shall be selected such that the maximum concentration measured is no more than 90 percent of the range and the average concentration is no less than 10 percent of the range.

5.3 Carbon Dioxide Analyzer

Use a NDIR analyzer for measurement of exhaust CO_2 concentrations. To the extent practical, the analyzer range shall be selected such that the maximum concentration measured is no more than 90 percent of the range and the average concentration is no less than 10 percent of the range.

5.4 Volume

Use a calibrated positive displacement gas volume meter or a turbine meter for measurement of volumetric flow rate.

Use rotary type positive displacement meter(s) with a back pressure limit (BPL) less than:

1.10 inches water column at a flowrate of 3,000 CFH down to
0.05 inches water column at a flowrate of 30 CFH for a meter with a rating over 1000 CFH and

0.70 inches water column at a flowrate of 800 CFH down to
0.04 inches water column at a flowrate of 16 CFH for a meter with a rating of or under 1000 CFH.

Meter(s) shall be equipped with taps accommodating the following equipment:

(1) taps on the inlet side for

   (a) a thermocouple with a range of 0 to 150 °F and

   (b) a pressure gauge with a range providing absolute pressure readings within 10 to 90% of the range (more than one gauge shall be used, if necessary) and

(2) taps on the inlet and outlet sides for a differential pressure gauge with a range of 0 to < 2x BPL (i.e. full scale shall be less than twice the back pressure limit) or any other range appropriate to allow detection of a pressure drop greater than the BPL.

5.5 Pressure

Use a pressure measuring device (transducer, inclined manometer or Magnahelic gauge) with a design range suitable for the pressure being measured. The tap for the pressure measurement will be located on the sample coupling attached to the inlet of the volume meter.

5.6 Temperature

Use a temperature measuring device (thermocouple or mercury in glass thermometer) with a design range suitable for the temperature being measured. The tap for the temperature measurement will be located on the sample coupling attached to the inlet of the volume meter.

5.7 Other Sampling Implements

The sample schematic (~~Figure 1~~ TP-201.2 Figure 12) requires, in flow order from the sample manifold:

(1) a vapor/liquid separator,
(2) a fine-particulate matter filter,
(3) a pressure tap,
(4) an adjustable bypass valve for vapor return to the sample manifold (not necessary for sleeve sampling), and
(5) a rotameter

The sample line shall be of inert material (teflon is preferred). The sample pump will be a stainless steel bellows type.

6 CALIBRATION PROCEDURE

A record of all calibrations shall be maintained.

6.1 Analyzers

Follow the manufacturer's instructions concerning warm-up time and adjustments. On each test day prior to testing, zero the analyzer with a zero gas and span with a known concentration of calibration gas at a level near the highest concentration expected. Perform an intermediate zero and span calibration approximately 2 hours after the initial calibration and at any time a calibration drift is evident. Check for zero and span calibration drift at the end of the test period. All calibration and adjustments shall be documented.

6.2 Volume Meters

Meters shall be calibrated on an annual basis.

6.3 Pressure Transducers

Calibrate pressure transducers prior to testing and immediately following the test period with a static pressure calibrator for a range such that measured pressures fall within 10% to 90% of the range. ~~of -3 to +3 inches water or appropriate range of operation.~~

6.4 Temperature Transducers

Calibrate temperature transducers ~~every six months~~ at the beginning and end of each week of testing using ice water and using ambient air, the temperature of which is determined by a NIST traceable mercury-glass thermometer.

7 PRE-TEST PROTOCOL

7.1 Location of Test Site

Prototype systems will be located within 50 miles of Sacramento for testing. Other locations may be accepted at the discretion of the ARB Executive Officer.

7.2 Specification of Test, Challenge, and Failure Modes

The specification of test, challenge, and failure modes such as the number of liquid transfer episodes, volume and volumetric rate of liquid transfer, storage tank volumes, etc. shall be done according to the principles of CP-205 § 5 for the testing and evaluation of vapor recovery equipment.

7.3 System and Facility Preparation

System equipment and components shall be completely operational and any storage tanks involved in the test shall be filled to the appropriate volume a minimum of 24 hours prior to the scheduled test.

In addition, the system and facility shall be prepared to operate according to any specified test, challenge, and failure modes.

8 TEST PROCEDURE

The facility and system shall be prepared to operate according to any specified test, challenge, and failure modes.

In this section, the term "vent" and the specified procedures for testing vents shall also apply to any assist processor with which such procedures are compatible. Procedures are also specified for incinerator type assist processors. Any assist processor which is incompatible with the application of these procedures shall not be certified until the compatibility requirements of the certification procedures are met.

8.1 Test Locations

Figure 1 illustrates mass flux test locations.

8.1.1 Test Point 1 (Vapor Return Line)

The vapor return line sample and temperature and pressure measurements must be taken from the camlocked sample manifold which has been inserted at a fitting in the vapor return line. Unaltered sample shall be returned to the sample manifold.

Volume and volumetric flow rate may be directly measured at Test Point 1 only after an engineering evaluation has determined that ~~there will not be excessive pressure drop across~~ the volume meter meets the requirements of Section 5.4. Otherwise these parameters will be calculated from the volume of liquid transferred.

8.1.2 Test Point 2 (Vent and/or Assist Processor)

The vent and/or the assist processor sample and temperature and pressure measurements must be taken from a sample manifold attached to the inlet side of the volume meter which has been inserted at a break in the vent line or at the exhaust side of a assist processor. The operation of test equipment shall not interfere with the normal operation of any valve or vent. Unaltered sample shall be returned to the sample manifold.

Data for calculating vent and/or assist processor emissions shall be collected for a time following completion of the portion of the test involving specified facility operations. The determination of the appropriate duration for such data collection shall be made by the ARB Executive Officer based on an engineering evaluation of data collected during and after the specified facility operations.

8.1.3 Test Point 3 (Vapor Incinerator)

Specific procedures are provided below for testing incinerators due to the complexity of such testing. Other types of assist processors, e.g. adsorbers, are tested by the more conventional hydrocarbon sampling and analytical procedures specified in other sections.

8.1.3.1 Incinerator Performance Specifications

Incinerator emissions shall be determined using the procedures of EPA M-2B, as outlined in this procedure, including any additional requirements provided below.

Any incinerator shall be evaluated and tested to establish:

(1) a performance specification for ~~carbon monoxide (CO)~~ hydrocarbon (HC) emissions and

(2) performance specifications for other critical incinerator operating parameters per CP-201 § 3 which requires, in part:

The results of evaluation and testing of the system, documented in the certification test report, shall include:

(1) the identification of such critical system operating parameters,

(2) the performance specifications for such critical system operating parameters, and

(3) the specification of requirements for indicating gauges, detection devices, and alarms.

Challenge and failure mode testing shall be performed to establish system sensitivity to and performance specifications for the following variables:

(1) storage tank ullage at start of liquid transfer and

(2) volume and volumetric rate of liquid transfer.

~~(3) number of nozzles in simultaneous use and~~

~~(4) individual nozzle dispensing rates.~~

Compliance with the incinerator performance specifications shall be determined per CP-201, as applicable.

8.1.3.2 Incinerator Sampling Parameters

A preliminary evaluation of incinerator operation shall be conducted to assess the rate of change of the magnitude of measured parameters. An appropriate time interval for data recording shall be determined. ~~A preliminary evaluation of incinerator operation shall be conducted to determine data collection intervals for~~

~~time and parameter magnitude for each parameter.~~ Such intervals shall be chosen to provide calculated estimates of incinerator mass emissions factors which differ by no more than ± 10% from actual, based on engineering judgment.

Data for each parameter shall be collected on such intervals.

Collect and record incinerator data for all of the parameters required to make a determination per EPA M-2B, with additional requirements for auxiliary fuel to expand the applicability of EPA M-2B:

V_{in} = total inlet volume entering vapor incinerator (SCF)

$V_{facility}$ = inlet volume from the facility vapor space (SCF)

V_{fuel} = inlet volume of auxiliary fuel (SCF)

V_{out} = vapor incinerator outlet volume (SCF)

N = number of carbon atoms in each molecule of calibration gas

$[HC]_{facility}$ = hydrocarbon concentration of inlet volume from the facility vapor space (volume fraction)

$[HC]_{fuel}$ = hydrocarbon concentration of auxiliary fuel (volume fraction)

$[HC]_{out}$ = vapor incinerator outlet hydrocarbon concentration (ppm)

8.1.3.3 Incinerator Visual Inspection

Visual Inspection. Any visible emissions except for steam, from vapor incinerators are an indication of poor combustion. An incinerator shall not emit air contaminants (not including moisture) in such a manner that the opacity of the emission is greater than 10 percent for a period or periods aggregating more than one minute in any 60 consecutive minutes; or greater than 40 percent opacity at any time. Should such visible emissions from the exhaust be detected, the control system is unacceptable and the problem must be corrected and an application made to the ARB Executive Officer for reconsideration for certification.

8.1.3.4 Incinerator Exhaust Sample Location

The vapor incinerator exhaust sample must be taken from the exhaust stack downstream of the burner far enough to permit complete mixing of the combustion gases. For most sources, this point is at least eight stack diameters downstream of any interference and two diameters upstream of the stack exit. There are many cases where these conditions cannot be met. The sample point shall be no less than one stack diameter from the stack exit and one stack diameter above the high point of the flame and be at a point of maximum velocity head.

8.1.3.5 Incinerator Inlet Sample Location

The vapor incinerator inlet sample and temperature and pressure measurements must be taken from a sample manifold attached to the inlet side of the volume meter which has been inserted at a break in the inlet line. The installation of test equipment shall not interfere with the normal operation of the vapor incinerator. Unaltered sample shall be returned to the sample manifold.

8.2 General Sampling Parameters

The test team shall collect and record frequent periodic or continuous measurements of the following sample gas variables shown in hexagon outlines in Figure 1:

HC = Hydrocarbon Concentration

CO = Carbon Monoxide Concentration

CO_2 = Carbon Dioxide Concentration

V = Volume

P = Pressure

T = Temperature

8.3 Other Sampling Parameters

Stored Fuel

Temperature

Test Point 1 (Vapor Return)

Dispensed Fuel Volume

Test Point 2 (Vent and/or Assist Processor)

Valve Cracking Pressure

9 QUALITY ASSURANCE / QUALITY CONTROL (QA/QC)

9.1 Analyzers

Perform a comprehensive calibration in the laboratory every six months. Check the analyzer with several known concentrations of calibration gas from reference cylinders to determine linearity.

9.2 Calibration Gases

Calibration gases are classified into three types:

(1) **Standard Reference Materials**

These are **primary standards** to which all other standards shall be traceable. For any substance for which no standard reference material is obtainable, a calibration gas of the highest level of accuracy and precision obtainable shall qualify as a standard reference material, subject to approval by the ARB Executive Officer.

A standard reference material, which normally is kept at a main laboratory, qualifies as an intermediate standard and as a working standard, too.

(2) **Intermediate Standards**

These are **secondary standards** which shall be assayed versus the corresponding NIST-SRM once every six months with a concentration difference which is no more than one percent of the results for the NIST-SRM. An intermediate standard container which does not meet its assay requirement shall be taken out of service. To re-enter service, the intermediate standard container shall be recharged and meet its assay requirement.

An intermediate standard, which normally is kept at a branch laboratory or a shop, qualifies as a working standard, too.

(3) **Working Standards**

These are **tertiary standards** which shall be assayed versus the corresponding intermediate standard before every test with a concentration difference which is no more than one percent of the results for the intermediate standard. A working standard container which does not meet its assay requirement shall be taken out of service. To re-enter service, the working standard container shall be recharged and meet its assay requirement.

A working standard normally serves for field calibration and testing.

All calibrations shall be performed with a calibration gas of at least working standard quality. Any cylinder is to be recharged or taken out of service when the cylinder pressure drops to 10 percent of the original pressure.

Information on calibration gas containers shall be entered into a permanent log identifying each container by serial number. Sufficient information shall be maintained to allow a determination of the compliance status of each calibration gas per these requirements; such information shall include for each container, but not be limited to each:

(1) date put in service,
(2) assay result, and
(3) date taken out of service.

9.3 Volume Meters

Standard methods and equipment shall be used to calibrate the meters on an annual basis. The calibration curves are to be traceable to NIST standards.

10 RECORDING DATA

Written data records must be kept during testing and must contain all information used to calculate and report final results. These written data records must be kept permanently filed and available for inspection. The final results must be verifiable by recalculation from the written data records.

11 CALCULATING RESULTS

> **NOTE:** In addition to other required calculations, vapor recovery system test results shall be calculated in units of pounds of hydrocarbon emitted per thousand gallons of fuel transferred for any results which are expressible in such units.

Calculate all efficiency results to the nearest 0.1%.

In this section, the term "vent" and the specified procedures for calculating results from vent data shall also apply to any assist processor with which such procedures are compatible. Procedures are also specified for incinerator type assist processors. Any assist processor which is incompatible with the application of these procedures shall not be certified until the compatibility requirements of the certification procedures are met.

11.1 General Nomenclature

Figure 1 illustrates some parameters specified in the calculations.

11.1.1 Parameters

General parameters are listed below, other parameters are defined in the calculations or alternative procedures:

[HC] = hydrocarbon concentration (volume fraction),

V_m = measured volume of gases and vapors,

P = pressure, and

T = temperature.

For any dispensing episode:

D = volume of liquid dispensed, and
Δt = elapsed time of dispensing.

11.1.2 Subscripts

Subscripts shall be used to distinguish parameters and modes of measurement, e.g.:

$P_{(s,e,t)}$ = value of parameter "P" for subinterval "s" of dispensing episode "e" at test point "t".

Any or all of these subscripts may modify a parameter, and for consistency, subscripts will appear in the order given above, e.g.:

$P_{(e,t)}$ = value of parameter "P" for dispensing episode "e" at test point "t"; and

P_t = value of parameter "P" for an entire test at test point "t".

11.2 Standardization and Calibration of Parameters

11.2.1 Volume Standardization

Directly measured volumes (such as those directly measured for Test Points 2 and 3) shall be standardized as follows:

$$V = V_m \left(\frac{528}{T} \right) \left(\frac{P_b + \left(\frac{P}{13.6} \right)}{29.92} \right)$$

where:

V = volume corrected to standard conditions (ft^3).

V_m = measured volume (ft^3).

P_b = barometric pressure (in. Hg).

P = differential pressure in sample line (in. water gauge).

T = temperature of gas stream (^oR).

11.2.2 Concentration

Each measured concentration of gas and vapor shall be corrected for any analyzer zero and/or span drifts and shall be expressed as a volume fraction (i.e. % or ppm).

11.2.3 Mass

Masses shall be calculated from calibration data and measurements as follows:

$$m = \left(\frac{MW}{385} \right) \text{ x } [HC] \text{ x } V$$

where:

m = mass (lb_m)

MW = molecular weight of calibration gas (lb_m/lb-mole)

385 = standard volume of one lb-mole at 528°R and 29.92 in. Hg

Note for manual data reduction: In general, $[HC]_{(e,t)}$ will stabilize to a steady value during a dispensing interval. If this is not the case, break $V_{(e,t)}$ into "s" subintervals and calculate:

$$m_{(e,t)} = \left(\frac{MW}{385}\right) \text{ x } \sum_{1}^{s}\left([HC]_{(s,e,t)} \text{ x } V_{(s,e,t)}\right)$$

11.3 Volume Calculations

11.3.1 Volume for Test Point 1 (Vapor Return)

If the volume for Test Point 1 is directly measured, it shall be standardized per § 11.2.1.

If the volume for Test Point 1 is not directly measured, it shall be calculated as follows:

$$V_1 = (0.1337 \ G)\left(\frac{528}{T}\right)\left(\frac{P_b + \left(\frac{P}{13.6}\right)}{29.92}\right)$$

where:

V_1 = volume corrected to standard conditions.

G = gallons of gasoline loaded.

P_b = barometric pressure (in. Hg).

P = final pressure in storage or delivery tank (in. water gauge).

T = temperature of gas stream (°R).

11.3.2 Volume for Test Point 2 (Vent and/or Assist Processor)

This volume is directly measured and shall be standardized per § 11.2.1.

11.3.3 Volume for Test Point 3 (Incinerator)

11.3.3.1 Preliminary Incinerator Outlet Volume Calculations

Note the possiblity for simplifying assumptions described in § 8.1.3.2.

Before calculating the vapor incinerator outlet volume, calculate the following preliminary values:

(1) **inlet volume from the facility vapor space**

Any inlet volume from the facility vapor space entering the vapor incinerator is directly measured and shall be standardized per § 11.2.1.

(2) **inlet volume auxiliary fuel**

Any inlet volume from auxiliary fuel entering the vapor incinerator is directly measured and shall be standardized per § 11.2.1.

(3) **total inlet volume entering vapor incinerator**

$$V_{in} = V_{facility} + V_{fuel}$$

where:

V_{in} = total inlet volume entering vapor incinerator (SCF)

$V_{facility}$ = inlet volume from the facility vapor space (SCF)

V_{fuel} = inlet volume of auxiliary fuel (SCF)

(4) **inlet hydrocarbon concentration**

$$[HC]_{i}n = \frac{(N\ [HC]_{facility}\ V_{facility}) + (N\ [HC]_{fuel}\ V_{fuel})}{V_{in}}$$

where:

$[HC]_{in}$ = inlet hydrocarbon concentration entering vapor incinerator (ppm)

N = number of carbon atoms in each molecule of calibration gas

$[HC]_{facility}$ = hydrocarbon concentration of inlet volume from the facility vapor space (volume fraction)

$[HC]_{fuel}$ = hydrocarbon concentration of auxiliary fuel (volume fraction)

11.3.3.2 Final Incinerator Outlet Volume Calculations

Calculate any vapor incinerator outlet volume using the following equation:

$$V_{out} = V_{in}\left(\frac{[HC]_{in}}{N\ [HC]_{out} + [CO_2] + [CO] - 300}\right)$$

where:

V_{out} = vapor incinerator outlet volume (SCF)

N = number of carbon atoms in each molecule of calibration gas

$[HC]_{out}$ = vapor incinerator outlet hydrocarbon concentration (ppm)

$[CO_2]$ = vapor incinerator outlet carbon dioxide concentration (ppm)

$[CO]$ = vapor incinerator outlet carbon monoxide concentration (ppm)

300 = assumed background concentration (ppm) of CO_2

11.4 Efficiency

The efficiency is based on the vapor mass flux through three significant areas:

$m_{(1)}$ = the mass flux through the vapor return line;

$m_{(2)}$ = the mass flux through the vent and/or assist processor; and

$m_{(3)}$ = the mass flux through the vapor incinerator.

The percent vapor recovery efficiency is calculated as follows:

$$\%\ \text{vapor recovery efficiency} = \frac{m_{(1)} - [m_{(2)} + m_{(3)}]}{m_{(1)}} \times 10$$

12 REPORTING RESULTS

> **NOTE:** In addition to other required results, vapor recovery system test results shall be reported in units of pounds of hydrocarbon emitted per thousand gallons of fuel transferred for any results which are expressible in such units.

Report all efficiency results to the nearest 1%.

Results will be reported as specified in CP-205.

13 ALTERNATIVE TEST PROCEDURES

Test procedures, other than specified above, shall only be used if prior written approval is obtained from the ARB Executive Officer. In order to secure the ARB Executive Officer's approval of an alternative test procedure, the applicant is responsible for demonstrating to the ARB Executive Officer's satisfaction that the alternative test procedure is equivalent to this test procedure.

(1) Such approval shall be granted on a case-by-case basis only. Because of the evolving nature of technology and procedures for vapor recovery systems, such approval shall not be granted in subsequent cases without a new request for approval and a new demonstration of equivalency.

(2) Documentation of any such approvals, demonstrations, and approvals shall be maintained in the ARB Executive Officer's files and shall be made available upon request.

14 REFERENCES

This section is reserved for future specification.

15 EXAMPLE FIGURES

Figure 1 is a schematic drawing showing some of the test location details for novel facilities.

Each figure provides an illustration of an implementation which conforms to the requirements of this test procedure; other implementations which so conform are acceptable, too. Any specifications or dimensions provided in the figures are for example only, unless such specifications or dimensions are provided as requirements in the text of this or some other required test procedure.

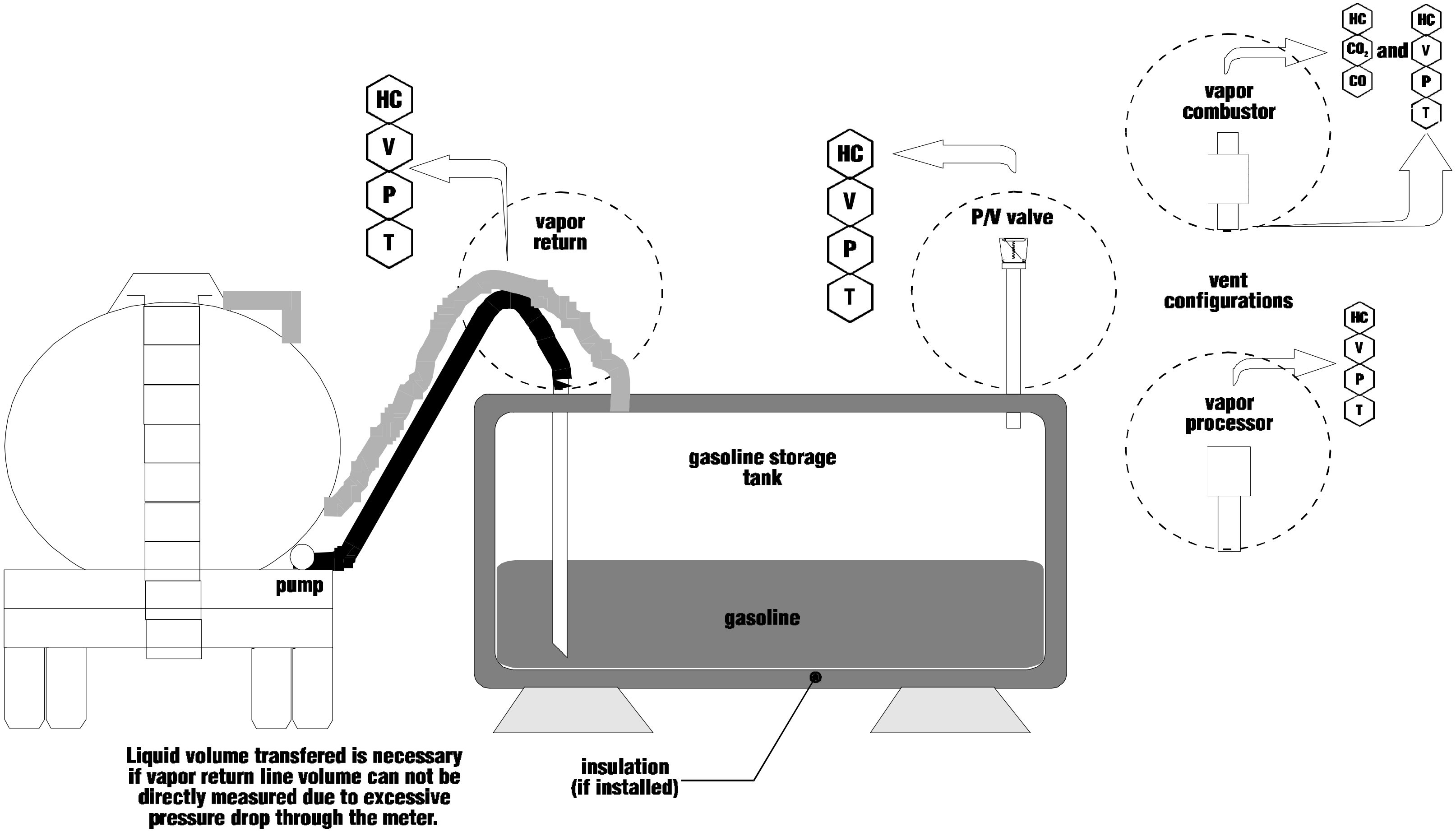
NOTE: Further procedural details, figures, forms, and tables are provided in the other test procedures; such can be used after appropriate modifications for novel aspects of a tested system have been made, on a case-by-case basis, subsequent to an engineering evaluation.

Figure 1
Test Locations for Novel Facilities

Revised

FIGURE 1

Test Locations for Novel Facilities



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